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FACTORS RELATED TO DISABILITY IN READING

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Introductory Statement

ONE OF THE pressing problems facing educators and psychologists in recent years has been that of the child who fails to acquire facility in the processes of reading and writing. Some of the pupils do not achieve in written language on a level with others of their age because they do not have the general capacity for achievement in any area. Others who lag considerably behind the average for the age group are alert in areas which do not require dealing with printed and written language symbols.

For those pupils who are mentally retarded, various plans for education have been evolved. Considerable attention has been devoted to them in the professional literature (95) as well as in the teachers' meetings of most schools. Special classes have been set up. Attempts have been made to provide these people with whatever kind of help will enable them to lead most nearly normal and self-directing lives. The futility of attempting to teach them information and processes beyond their capacity has been fairly widely recognized. Instead of many "reteachings" of matter beyond their grasp, adjustments have been made in the programs which they follow.

Unfortunately, equivalent steps have not been taken to care for those who "fail" in reading but are otherwise alert. Too often the child who fails, not because of limited general capacity, but for other reasons, has been neglected. In many cases he has been labeled as of low level capacity and, therefore, not expected to achieve. He has been placed with children of limited intelligence and provided the same type program as they. At other times he has been considered lazy and negativistic to learning. Parents and teachers alike may have recognized that he is not unintelligent. He speaks and acts intelligently about things that interest him. He does well in out-of-school activities that obviously require an alert mind. Hence, they reach the conclusion that the explanation can only be that he does not try to do well in school. They are certain that all it would take for him to achieve is a bit of determined effort. For these reasons the child of this type has frequently not been promoted in school, partially as punishment for his "laziness" and partially in an honest effort to make him learn. In addition, he has been goaded and threatened at home, kept in at night to do extra work, drilled on work assigned for the next day—all with the principal result of frustration for both parent and child.

Gradually it has been recognized that normal intellectual capacity does not guarantee success in any particular field of learning. An individual's mental capacity as measured by accepted intelligence tests may be normal or superior and yet he may be failing in certain intellectual pursuits. When the specific difficulty which is causing his failure is an observable physical handicap, blindness for example, the problem is recognized and an attempt made to do something about it. When the difficulty does not show on the surface, the person is not likely to be so aided.

Many investigations have been made in an attempt to determine some of the causes for and to study factors related to failure among those of high mental capacity. Attention will be focused here only on those which specifically relate to failure in reading. The consensus among those who have carried on studies of reading disability occurring in cases of adequate capacity is that rarely is there a single causal factor which can be identified. Rather, a constellation of related factors is usually found. The prospect for correction of the inadequacies is good, however, if the contributing factors are identified and the instructional program adjusted in terms of them.

Gates (62:15) has summarized this viewpoint:

> In brief, reading disabilities result from failure to identify all possible handicaps and to arrange instruction in such a way that they are directly or indirectly surmounted. The causes of reading disability are many; the remedies lie in improved, especially highly individualized instruction.

That many factors may be involved in a specific reading disability and that there is considerable difficulty in identifying causative factors has been pointed out by many investigators. Gates and Bennett (64) felt that acquired techniques, rather than any inherent or basic brain

organization, were probably responsible for defeats in acquisition of reading skills. They emphasized that the contributing factors were many, and gave a rather extensive list of possible causes, including basic physical defects and the results of training. In addition, they cautioned against assuming that correlation of certain factors with reading disability necessarily implied causation.

Monroe (107) was careful to point out that even the occurrence of particular errors in reading might not indicate that the same causative factors were operating. She summarized with these ideas on the causes of reading disability:

1. Although certain factors (e.g., auditory discrimination, or left-eye and right-hand preference) were statistically significant in distinguishing groups of achieving readers and disability cases,
   a. these factors also appeared in certain cases in the achieving group,
   b. there was no one factor which was operative in all of the disability cases.

2. Although some factors (e.g., illnesses or accidents, visual acuity) were not statistically significant in distinguishing between achieving and retarded readers, they might still be factors which impeded the progress of certain individuals in learning to read.

3. The special defect in acquiring skill in dealing with visual symbols was probably attributable to a constellation of factors rather than to any single one.

4. Specific difficulty with reading is probably a result of the fact that the number and severity of the negative factors exceeds the number and strength of the positive ones.

Origin of Specific Reading Disability

The first identification of cases of disability in reading not accompanied by general mental retardation or serious visual deficiency appears to have been in England. In 1896 Morgan (112) noted the similarity between children experiencing a specific difficulty in learning to read and adults who had lost the ability to read after damage to the brain. It was he who first used the term congenital word-blindness, the use of the label being predicated upon the theory of neurological involvement.

Twenty-five years later Hinshelwood (84), likewise, interpreted his observations of cases to mean that the disability in dealing with visual symbols was attributable to malfunctioning of certain brain areas. He assigned the causes of the disability to destruction or improper development of the visual memory center, the gyrus angularis and gyrus supramarginalis of the left hemisphere of the brain. He suggested the classification of reading disability cases into three groups and the use of three different terms to describe them:

1. Congenital word-blindness—pure defect of the visual memory for words and letters.
2. Congenital dyslexia—slighter degrees of defect, but characterized by much greater difficulty with learning to read than is encountered by the average child.
3. Congenital alexia—defect of the visual memory center as only one part of general cerebral deterioration.

Another English investigator, Rutherford (138), wrote in 1909 that he considered specific reading disability one of the many biological variations which could be expected in the total population and felt that it would be distributed on the normal curve. He felt that the occurrence of these cases represented a reversion in the species caused by the loss of certain specialized determinants in the germ plasm. This theory of origin would lead to the implication that remedial work with these cases would probably be unprofitable.

Ranschburg (124) agreed with others that the visual memory center for words was at the root of specific reading disability. However, he explained the malfunctioning of the center not in terms of structure but in terms of blood supply to the area. He felt that the brain was not structurally imperfect, but was under supplied with blood and, therefore, unable to perform adequately.

Another theory of the origin of specific reading disability which centered in functioning of the brain rather than on structure was that of Orton (115, 116, 117, 118). He disagreed with the possibility advanced by earlier writers, such as Hinshelwood, that there was congenital maldevelopment of the angular gyrus. He based his lack of acceptance of this theory on the fact that postmortem examinations did not show defects of structure with nearly the frequency of reading disability. He also pointed out the fact that if the theory of one hemisphere's taking over the functions was accepted, such disabilities would have to involve the same portion of both sides of the brain, an exceedingly rare occurrence.

Orton agreed that the disturbance was one of defect of visual memory. He explained it in terms of inability to retain a visual picture which would lead to recognition of the form when it was again encountered. He held to the earlier idea of actual records stored in the brain. He saw this process as a function of both hemispheres of the brain, each forming its own record of the

word form which was seen. One side of the brain was dominant and the records, or "engrams," in that hemisphere were retained for interpretation of the word form when it was again encountered. The engrams formed in the non-dominant hemisphere, oppositely oriented, were elided under normal conditions. When the dominance in the brain was not clearly established, he felt that these reversed engrams interfered with proper identification of previously contacted forms.

Orton's opinion that specific reading disability is a functional disorder rather than a result of structural defects of the brain is well founded. However, the idea that actual visual patterns are stored in the brain is untenable. He developed this theory in an attempt to explain certain symptoms of difficulty with reading. There is no support in neurological and psychological findings for such a theory.

Other theories of causation which involve the idea of lateral dominance have been advanced. The influence of this factor on reading disabilities will be discussed further in the section on Dominance.

More recently, the possible influence of birth injuries as causative factors in reading disability has been pointed out. Anderson and Kelly (2) included it in their list of possible causes. Gesell and Amatruda (69) expressed the opinion that many injuries so slight as to escape detection undoubtedly occur at birth or during the first three years of life. They felt that these relatively mild neurological disturbances might account for the lack of clear cut dominance and result in reading or speech disabilities as well as poor muscular coordination.

Jensen (90) agreed with the theory set forth by Gesell. He felt that these neurological injuries might also account for some faulty coordination of the eyes and unsatisfactory auditory discrimination. He noted that, in the cases he studied, there was frequently a history of difficult birth.

Harris (78:221, 222), in discussing signs of neurological difficulties, indicated that he would agree with the opinions expressed above:

> Symptoms which may lead a psychologist or teacher to recommend a neurological examination include the following: a history of difficult birth, with prolonged labor, instrumental delivery, marked deformity of the head, difficulty in getting breathing started, difficulty in sucking and swallowing, etc.; poor equilibrium and general awkwardness; convulsive seizures; and signs of organic helplessness on certain psychological tests such as the Rorschach and the Kohs Block-Design Tests.

Acquired and Congenital Disability in Reading

Although much has been learned from the study of cases in which ability to read was lost after brain injury (70, 72, 80, 166, 169), the acquired and congenital difficulties are not entirely similar. Many of the theories of causation discussed above had their basis in the idea that the two types of inability to read were almost identical. Actually the manifestations of difficulty may be very closely related. However, certain differences in the cases must be kept in mind. Head (80), Weisenburg and McBride (166), Goldstein (70), Granich (72), and Wepman (169) all discuss cases in which the functions of language were disturbed. In their consideration of the training of these cases, however, they are dealing with functions which previously had been intact. The problem of learning to read when the function had been disturbed was one of retraining rather than one of first learnings.

Wepman (169:121, 122) indicated this essential distinction in the type of cases:

> Aphasia re-education is not a matter of teaching a new vocabulary, new reading, new spelling, etc., but rather reopening of the pathways leading to previous learning of the individual. What is expected is recall of previously learned material, physiologically repressed by trauma to the neurological system.

The complexity of the language disturbances occurring seems to be similar in both acquired and congenital cases of reading disability. Orton (115, 116) pointed out that the various facets of language—reading, writing, and speech—are so closely linked that there is rarely a disturbance in one without accompanying defects in the others. In his discussions of children who encounter unusually severe problems in dealing with written language, he refers to frequent instances of "degradation of speech." He found that spelling was almost always impossible for these cases. In other words, the difficulty with reading was not a "pure" defect in the sense that all other language functions were undisturbed. Rather it was the most strikingly severe of a number of disturbances.

Because language abilities develop in an orderly sequence and are dependent on each other, disturbance in one facet of language would not be expected without accompanying disturbances in other facets. Difficulties in speech, for instance, might easily result in problems with reading and spelling. Difficulties in various facets of language might cause difficulties in others, or might arise from common causes.

This same complexity of disturbance has been pointed out by investigators of alexia trace-

able to specific brain injury after the ability to deal with written language had been acquired. Weisenburg and McBride (166:66), after reviewing various accounts of "pure" alexia, stated:

> Actually the well-studied and fully reported cases in the literature are not pure in the sense of being uncomplicated by other language disturbances.

Goldstein (70:121) summarizes the complex symptoms which were evidenced in one of the cases studied. He felt that the primary difficulty with this case might lie in the "impairment of abstraction." Head (80:312-317) shows the variations in reading disability which occur with the four different aphasias—verbal, syntactical, nominal and semantic. He gives certain basic characteristics of each of these disturbances of language function. In verbal aphasia there is an inability to find the exact word forms or word combinations needed for speech or writing. In syntactical aphasia, the rhythmic and syntactical patterns of speech and writing are disturbed, speech is apt to be overly rapid and incoherent with most connectives omitted. In nominal aphasia, the ability to find appropriate words to label objects, situations, etc., is lacking in spite of the subject's large stock of words. In semantic aphasia the primary disturbance is of the ability to interpret the significance of language except on a very superficial and immediate basis. In each case, the disability in reading is closely tied to the manifestations of the difficulty in other facets of language.

Fernald (57:164), having reviewed the literature on the reading disabilities caused by brain damage, found that her subjects manifested much the same pattern of symptoms:

> The resemblance of our cases of extreme reading disability to those of alexia caused by brain lesion or injury seems to suggest the possibility that the former are due to certain variations in the integrated brain functioning involving the same region as that in which the lesion is found in acquired alexia.

In summary, in all cases of disturbed language functions, more than one facet of language will probably be affected. The program of correction of disturbances of language must be planned with this fact in mind and with full consideration to the interrelationships among language functions. In the normal developmental sequence, ability to interpret language precedes ability to reproduce it. Ability to deal with oral language precedes ability to deal with visual language symbols. Hence, the order of development is understanding of spoken language, speaking, understanding of printed symbols (reading), reproduction of visual language symbols (writing). Unless success had been achieved in one of these areas, attempts to go on to the next will be futile.

Relationships of Selected Factors to Reading Disability

In an attempt to arrive at the identification of possible causative or contributing factors in reading difficulty, many investigators have studied the relationships between selected factors (e.g., intelligence, visual difficulties, emotional status, dominance, etc.,) and ability to read. Certain weaknesses are evident in many of these studies. There has frequently been no adequate definition of achieving and retarded readers in terms of general capacity (e.g., 10, 28, 87, 177). In some cases, only subjective judgment was used to determine rankings in reading achievement (e.g., 176). In others, interest in one factor or viewpoint has seemed to prejudice the population, the design, or the results of the study (e.g., 42, 60). Within these and other limitations, however, the investigations suggest possible relationships between the factors studied and reading disability.

Because the interest in this study is focused on the child of normal or superior intelligence who has difficulty with interpreting and reproducing visual language symbols, investigations of intelligence and reading ability will not be considered. The results of investigations of the relationship of other factors of ability in reading will be reviewed.

Visual Functioning

Obvious cases of extremely limited vision have usually been taken care of through training in sight saving classes or with adjustments of the program to eliminate the need for reading when it was visually impossible. Many cases of undetected malfunctioning of the eyes, causing trouble with reading, have unfortunately been missed and the child's failure blamed on such factors as lack of intelligence or failure to try (111). Conversely, there have, in all probability, been cases in which a visual difficulty was thought to be the causative factor in lack of achievement, whereas actually some other factor or group of factors existed. The relationship between reading and visual performance has consequently been rather widely investigated.

After a thorough review of the results of many studies, Robinson (133) pointed out the lack of agreement as to the importance of visual difficulties in reading disability. Reports of the amount of association between problems of seeing and achievement in reading have varied greatly. Selzer (142) found that 85 percent of the reading disability cases he studied had some

visual problem. At the other extreme, Witty and Kopel (174) found that the reading disability cases in their population had higher visual acuity than did the good readers. Edson et al., (51) found no evidence that poor vision limited the reading achievement of the fourth graders they studied.

The particular populations studied and the types of visual screening may be responsible for the apparent disagreement in the findings. Reading disability has not always been defined in the same way. Some investigators have used populations of college students while others have used pupils in the primary grade. For some studies, vision specialists have made complete examinations; for others, the only criterion of good or poor vision was whether or not the subject wore glasses.

Of those who studied visual acuity and the presence of refractive errors, the majority have reported negative results. Eames (49), Monroe (107), and Witty and Kopel (175) all reported that findings in these areas did not distinguish the low and the high achievers, except that Eames did not find excessive exophoria associated with the group of low achievers. Fendrick (55), on the other hand, found visual acuity to be a differentiating factor between the two groups. All of the investigators emphasize the fact that very serious difficulties of this type would, of course, be detrimental to the development of adequate reading ability.

When the coordinate functioning of the two eyes was studied, the results seemed to be somewhat more consistent. In general, there appears to be agreement that eye muscle imbalance and faulty fusion are found more frequently among reading disability cases than among the groups of normal achievers. Betts (15), Eames (49), and Witty and Kopel (173) all report positive findings on the presence of a low level of coordinate functioning of the two eyes. The problem appears to be one of lack of comfort and efficiency in normal, two-eyed performance.

Robinson (133) observed that although visual defects frequently could be detected in cases of reading disability, not all of them appeared to be contributing factors in the difficulty. Originally, there were visual problems found in 73% of the cases she studied. In the final consideration of the cases, the visual difficulties were listed among the contributing causes in only 50%.

Betts and Austin (18:74), in summaring the results of a thorough study of the visual status of a fifth-grade population, said:

> There appears to be no significant relationship between achievement in reading, in terms of mental capacity for achievement, and the summation of visual factors appraised in this study. However, this should not be interpreted as meaning that ocular comfort and efficiency are not desirable pre-requisites for sustained reading activities.

The preponderance of evidence appears to lead to three conclusions. First, visual functioning and reading achievement are not significantly related. Second, visual difficulties may be contributing factors in reading disability. Third, detection and correction of visual difficulties may enhance comfort and efficiency in reading.

Auditory Functioning

The relationships between reading achievement and two facets of hearing have been investigated in most studies in this area. Tests of auditory acuity and auditory discrimination have been employed. In general, rather inconclusive results have been obtained on the possible relationship between acuity and reading disability. Kennedy (94) found that there was some tendency for poor hearing to be associated with low achievement in reading, but the relationship between auditory acuity and reading was not significant. She and Henry (81) both found that high frequency losses seemed to be more important than those in the lower ranges. Kennedy (94:250), although she used too few cases to consider significant, states that the high frequency loss cases "tended to become very good and more often poor readers." These losses seemed to separate the ends of the distribution of reading achievement from the middle of the group. She did not state the specific frequencies which seemed crucial. Henry (81) made no mention of particular high achievers with high frequency losses, but said that this type of loss was related, in her group, to deficiency in reading. Betts (16) reported more hearing impairments among those below average on the standardized reading test he administered than among those above average. He noted a striking similarity in the audiograms of the six below-average readers who had hearing losses. Whereas the three above-average readers had their maximum loss at 512, the below-average had losses at higher frequencies.

Only one important study seems to indicate a positive relationship between auditory acuity and reading disability. Bond (28) reported a significant difference between the reading disability cases and the controls in acuity, with the difference in favor of the control group. Ewers (54), Henry (81), Kennedy (94), and Robinson (133) found no conclusive evidence on this point. Kennedy, however, does state (94:250) that "there is a somewhat greater tendency for good hearers to become good readers and for those somewhat handicapped in hearing to read less well."

All the above mentioned investigators, with

the exception of Henry, who did not investigate the area, seem to agree that the most direct relationships found were between auditory discrimination, the ability to detect likenesses and differences in sounds, and reading ability. Bond (28), Ewers (54), Kennedy (94), Monroe (107), and Rutherford (138) all found positive relationships between ability in auditory discrimination and reading ability. Monroe emphasized the point that poor discrimination of sequence of sounds as well as of individual sounds was an important factor. She lists these difficulties among the possible causative factors in reading disability. Whether the relationship is a causative one is difficult to determine, but her control group did make consistently fewer errors in auditory discrimination than did her reading defect cases. Robinson (133) concurs on the fact that auditory discrimination difficulty appeared to be a cause of reading difficulty, and emphasized the fact that tests in this area are still not entirely adequate.

Discrimination of both speech sounds and pure tones has been investigated. Bond (28) emphasized, as did Monroe (107), the significance of the difficulty encountered by the poorer readers with the discrimination of speech sounds. Ewers (54) and Kennedy (94) both found the ability to discriminate pure tones of different frequencies to be similarly related to achievement in reading. Jones (92) included "training in auditory perception, especially sound discrimination," in the special lessons he gave his experimental group of "average third-grade pupils." Those who received these speech lessons made significantly higher gains on a standardized test of silent reading ability than did the matched members of the control group.

In summary, it would appear that there is no convincing evidence that auditory acuity and reading achievement are closely related. Poor auditory discrimination appears to be rather definitely linked to, and possibly a causative factor in, reading disability.

Speech and Language Development

Gaines (59), who reviewed the literature and presented possibly the best bibliography available to 1942, made it clear that only rather tentative conclusions on the relationship of speech problems to reading disability can be drawn. She states (59:109):

> That some relationship exists between speech defects and reading disability can be reasonably suspected from these various outstanding but by no means complete studies.

She attributed some of the difficulty in the area to the loose ratings of performance in speech. A second point to be considered is that in most of these studies groups of "good" and "poor" readers were selected on the basis of comparative rank on standardized tests of reading achievement. Actual amount of retardation in terms of capacity for achievement varied greatly within the groups. Even on the incidence of peculiarities and defects of speech there appears to be no general agreement, however.

Bond (28) found no more speech defects among low achievers in reading than among high achievers. Anderson and Kelley (2) recognized the tendency for more speech defects to occur among the reading disability cases. Monroe (107) and Bennett (10) found peculiarities of speech a positive factor in differentiating groups of low and high achievers. Rutherford (138) and Yedinack (177) found articulatory defects and difficulty with reproduction of sounds to be associated with low achievement in reading. Yedinack's study was concerned with second-grade children. She stated (177:57):

> Children with functional articulation defects are significantly inferior in both oral and silent reading to children with normal speaking ability. Furthermore, children with reading disability frequently have articulation defects.... Strong relationship between these two handicaps shows that either they result from a common cause or that articulatory defectiveness had a deleterious effect upon the development of normal reading ability.

Differences in interpretations of the relationships depend somewhat on whether oral or silent reading or both served as a criterion of reading performance. Bond (28) pointed out that in his group 35 percent of those who achieved decidedly lower ratings on tests of oral reading ability than on tests of silent reading ability had speech defects. Those who rated low in both oral and silent reading showed no significant incidence of speech problems. Obviously, difficulty with speech would be reflected in poor oral reading performance. However, Jones (92) found that speech training also brought significant gains in silent reading achievement.

Both Monroe (107) and Robinson (133) emphasize the point that speech and reading difficulties may be symptoms of a common cause of difficulty. Artley (4) points out, in addition, that difficulties in one area may cause difficulty in the other. Growth in one area is likely to bring growth in the other (5).

In view of the sequential development of language abilities, it would seem likely that retardation in general language development and retardation in reading might be related. Van Riper

(158) describes three kinds of retardation in speech development. Speech may be delayed (fail to develop), interrupted, or incomprehensible. He points out that both intrinsic factors (e.g., low intelligence, poor hearing, birth injury, diseases affecting the central nervous system and disturbing perceptual processes, paralysis, deficiencies in coordination, prolonged illness) and environmental influences (e.g., lack of motivation for talking, emotional conflicts, negativism, inadequate teaching of speech by parents, inadequate speech environment) can result in retarded speech development. Beckey (8) likewise found many of these same factors to be related to retardation in speech. One or more of these factors, in themselves, or because they led to an inadequate foundation in oral language facility, could produce retardation in reading. Bennett (10) pointed out that children with a history of retarded language development or speech defect, even if it was not currently in evidence, appeared to be more liable to failure in reading than those whose oral language had developed normally.

In a recent summary, Eames (50:53-54) has concluded:

> However, certain broad generalizations can be drawn.
>
> 1. Neurological lesions in the language centers or their interconnections may impair speech and reading.
> 2. Failure or inadequacy of auditory association and discrimination may predispose to either speech or reading trouble.
> 3. Speech defects occur in a certain proportion of reading failure and vice versa.
> 4. Emotional reactions to speech difficulties may impair reading.
> 5. Oral reading is more difficult for a person with a speech defect.
>
> Both speech and reading troubles are likely to stem from the same basic defect. Essentially the problem is neurological with psychological overtones.

The factors seem important in the relationships of speech and language development to reading disability. First, problems in either or both of the areas may be indicative of some more basic problem of which the speech and reading disabilities are symptoms. Certainly it has been concluded that disturbances of language functions do not occur without other accompanying disturbances of behavior and mental functions (70, 86). Second, deficiencies in speech and interpretation of oral language may interfere in the normal development of reading ability because of the sequence in which language develops.

Dominance

Two phases of patterns of lateral dominance have been extensively studied: dominance of areas in one hemisphere of the brain over comparable areas in the other hemisphere, referred to as "central" dominance; and preference for the use of one eye, hand, or foot over the other in certain designated activities, referred to as peripheral dominance. The relationship of all facets of achievement in reading and specific reading disability has been considered.

"Central" Dominance—Although disagreement still exists on specific localization of functions in certain areas, clinical observation of cases of acquired disabilities has led to some general conclusions. Head (79), Weisenburg and McBride (166), Goldstein (70), and Smith (146), for example, have all reviewed the various theories expounded since the early 19th century. The tendency, at present, appears to be consideration of language activity from a dynamic viewpoint. The position of the lesions found in cases in which reading had been disturbed, however, indicated that many of them occurred in the area designated by Hinshelwood (84).

Morgan and Stellar (110:505) stated:

> There is no doubt that in some functions, particularly language, one side of the cortex is frequently the major side while the other is the minor.

They observed that injury to the minor side did little to disturb reading; to the major side, sometimes caused complete inability to read.

Neilson (114) stated that there was a special area for coordination of language functions and that it was dominant in one hemisphere of the brain. When the major side did not function, language was greatly disturbed, but the area in the non-dominant side could take over in time.

Chesher (38), in a study of 157 patients with lesions in the language area of one hemisphere, found evidence which supported the view that there was a dominant hemisphere for language functions. This was the side opposed to that of the preferred hand. He pointed out, however, that great individual differences occurred and that for some patients, injury in either hemisphere could disturb language.

Weisenberg (165) found similar evidence of localization of lesions and of handedness as a criterion of the dominant brain hemisphere. He and McBride (166:452) reported evidence that handedness was a reliable index of "central" dominance in approximately 95 percent of their cases. On the specific difficulty of "word-blindness" they said (166:68):

> The purest cases coming to autopsy have shown a lesion in the tissue of the lingual gyrus.

Accepting the opinion of other investigators, as well as his own observations, Goldstein (70: 51) says:

> There is no doubt that defects of the higher mental performances, and hence particularly of language, occur in lesion in one—the 'leading'—hemisphere. Thus, we are almost always correct if we localize the lesion of a right-handed aphasic patient in the left hemisphere, and vice versa. That we are sometimes mistaken, e.g., that the lesion in a right-handed aphasic is found in the right hemisphere, can have various causes. It may be the effect of a lack of conclusiveness of the methods to determine the 'handedness' and the prevalence of the hemisphere.

Van Riper (159, 160), in his tests of "central" dominance, assumed that the dominant hand and brain area were opposed. The patterns drawn by the non-dominant hand were reversed at certain critical angles (159). He stated (160:294) that reversal of patterns with the hand normally preferred was indicative of confusion in lateral dominance. He found that those who were ambidextrous tended either to reverse with both hands or not to reverse at all.

Smith (146:58), in summarizing her review of literature on central dominance says:

> Word blindness can be caused by injury to appropriate areas in only one hemisphere.... Eleven subdivisions of the cerebral hemisphere comprise the functional area for association. These subdivisions are in pairs. The degree to which laterality has been developed varies from pair to pair. The extent and degree of dominance varies within the individual.

Smith (146) attempted to determine whether or not "central" dominance characteristics differentiated pupils achieving at their capacity levels from those whose reading achievement was significantly below their capacity levels. To measure central dominance, she used the Van Riper Form Board. She found that severely retarded readers made significantly more reversals with the right hand than with the left a 360°. This was true in spite of the fact that there was a higher percentage of right-handed among the retarded readers than among the achieving readers. No other evidence exists of the frequency with which apparent confusion of "central" dominance is associated with reading disability. This indication of higher incidence of confusion in "central" dominance, however, may have clinical significance in the analysis of cases of specific reading disability.

The implication appears to be that reading can be disturbed by malfunction of certain areas of the brain. The areas are usually dominant in one hemisphere of the brain and the malfunctioning in that side alone can cause language disorders.

The dominant side is usually, but not always, that opposed to the dominant hand. Confusion in "central" dominance appears to be related to specific disability with reading.

Peripheral Dominance—Peripheral dominance has been determined by testing hand, eye, and foot performance for activities of different types. Handedness and eyedness, particularly, have been studied in relation to reading disability. Widely varying viewpoints have been presented on the relationship of lateral preference in peripheral areas to reading achievement. In general, most of the proportions of right, left, and mixed preference found among reading disability cases do not fall outside the limits of the proportions to be found in a normal, unselected population. Dearborn's (42) figures deviate significantly. From his observations of children having difficulty with reading, he felt that the peripheral dominance factor might be significant as a cause of specific reading disability. The fact that he was known to be interested in problems of dominance probably led to his seeing an unusually large number of cases with peculiar hand and eye preference patterns.

Three manifestations of lateral preference in the peripheral areas have been considered as possibly important in relation to reading achievement. These are hand preference, eye preference, and the relationships between the two. Bennett (10) found the reported incidence of left-handedness from 4 percent to 11 percent; of left-eyedness, 22 percent to 44 percent; of unilateral preference for hand and eye, 54 percent to 85 percent; of preference for one hand and the opposite eye, 15 percent to 48 percent with a median of 20 percent; and of confused or indeterminant preference, 0 percent to 10 percent. Smith (146:16-17) gives a summary of the results of the studies of incidence of left-handedness and enumerates various factors which may influence the determination of such data. In this study only certain investigations which have considered dominance patterns as related to reading achievement will be discussed.

1. Hand Preference. The majority of investigators reported that there was no pattern of peripheral dominance, as indicated by hand preference, which distinguished reading disability cases from the normal population. Anderson

and Kelley (2), Bennett (10), Fendrick (55), Gates (62), Gates and Bond (66), Gates and Bennett (64), Haefner (75), Harris (77), Robinson (133), Smith (146), and Woody and Phillips (176) all reported that handedness of low achievers in reading did not differ significantly from that of the achieving readers. No particular handedness could be found with greater frequency among the retarded readers than among other groups. Spadino (147) found this to be true of speech disability cases also.

Certain other investigators reported dissimilar evidence on the relationship of handedness to achievement in reading. Lord, Carmichael and Dearborn (100) reported greater incidence of left-handedness and felt that the sinistrad tendency would tend to conflict with the conventional dextrad pattern of reading and writing. Monroe (107) found that there had been more changes of handedness in the reading disability cases she contacted than among the normal group. She also reported greater incidence of left-handedness among the members of the families of the reading disability cases. Smith (146) found, in her population, no significant differences between retarded and achieving readers in changes of handedness or incidence of left-handedness in the families. Selzer (142) found what he considered a disproportionate number of cases of left-handedness among the reading disability cases. However, he pointed out that much depended on the criteria of handedness. Some investigators used the hand preferred for writing as the only criterion of handedness. Others have used a variety of one- and two-hand performances and found the hand used most commonly.

Downey (46), likewise, emphasized the inaccuracies which were almost unavoidable in labeling handedness patterns of individuals. She presented evidence in support of her contention that handedness was definitely not a true dichotomy. She found that 60 percent of the "right-handed" preferred the left hand in some or all bimanual activities and that 70 percent of the "left-handed" made similar use of the right hand.

The overwhelming evidence seems to be on one side of the question of the relationships between handedness and achievement in reading. Left-handedness or confusion in handedness alone does not appear to be a significant factor in reading disability.

2. Eye Preference. Like hand preference, eye preference can be determined in many ways. Means of determining the preferred eye have varied from acceptance of the eye with the highest acuity as the preferred one to acceptance of the one used most consistently in a series of activities involving sighting, following objects, and other similar activities as the preferred one.

Bennett (10), Fendrick (55), Gates and Bond (66), Robinson (133), Smith (146), and Woody and Phillips (176) all reported negative findings. In the groups which they studied, patterns of eye preference did not appear to be a factor which helped to differentiate between achieving and retarded readers. They found no evidence of unusually frequent left or mixed eye preference among the low achievers in their groups.

Other investigators have revealed some positive findings or tendencies toward the significance of eye preference in reading disabilities. Gates and Bennett (64) felt that left-eye preference might be a real source of difficulty in reading. They found that as many as 10 percent of the left-eyed children they studied were likely to develop difficulty. Monroe (107) and Selzer (142) also stated that there was a greater incidence of left-eyedness among reading disability cases than in the normal population and that the left-eye preference might be a significant factor in reading disability. Harris (77), in his summary of the findings of various studies including his own, stated that right-eyedness was less frequent and left- and mixed-eyedness more frequent among the reading disability cases than in the normal population.

In spite of the variations in eye preference, one conclusion seems valid. Eye dominance alone is unreliable as an index to reading achievement.

3. Relationships Between Hand and Eye Preference. Although the consensus appears to be that neither handedness nor eye preference alone is a significant factor in reading achievement, another possible source of difficulty exists in the relationships between the two. Again, opinion is widely diverse.

Fendrick (55), Fernald (57), Gates and Bond (66), and Smith (146) all report that preference for one hand and the opposite eye did not occur with significantly greater frequency among the reading disability cases than among the achieving readers. Even though the greatest difference, in peripheral dominance, between the reading achievers and the retarded readers in her population occurred in the left-eyed, right-handed group (34 percent retarded, 24 percent achieving), Smith stated (146:141):

> On the basis of all the tests of hand and eye preference given, very small differences were found between retarded readers and reading achievers.

Dearborn (42) felt that preference for the use of one hand and the opposite eye was a real source of difficulty, especially because of the directional problems involved. Orton (118) pointed out as one of the characteristics of the group of specific reading disability cases the presence of a large number of children who showed mixed

or crossed peripheral dominance patterns. Monroe (107), although she found more consistently right dominant cases among the disability cases than any other type, found more left-eyed, right-handed cases among the disability cases than among the controls.

Bennett (10) felt that preference for one hand and the opposite eye appeared to occur with undue frequency among the disability cases. He assumed that unilateral dominance in peripheral areas was the normal development and that deviation from it arose from confusion in "central" dominance. He expressed the view that crossed dominance, in itself, probably was considered a causative factor when actually it should be traced back to its source and more fundamental factors discovered. He also stated that the presence of crossed dominance had sometimes been considered responsible for difficulty when possibly other unrelated factors were more likely operating as causes of reading disability.

Harris (77) reviewed various data on peripheral dominance findings. Some of the populations included were heavily weighted with cases of unusual dominance patterns. From the combined data, he reached certain conclusions relative to mixed dominance. He found that generally, the reading disability cases showed more deviations from the normal than did the reading achievers. Right-hand, left-eye preference was the most common pattern, apart from consistent right-sidedness, among the reading disability cases.

In summary, the evidence available on the significance of the relationships between hand and eye preference and reading disability is inconclusive. Greater incidence of lack of clear-cut lateral preference in these areas among low achievers in reading than among high achievers has been reported by some investigators. However, some doubt may be cast on the evidence from these studies: (1) achieving and retarded readers were not adequately defined; (2) a disproportionately high number of cases with unusual dominance patterns may have been studied by some of the investigators because of their special interest in such cases. Finally, the possibility exists that unusual patterns of peripheral dominance may be symptomatic of more basic difficulties rather than causal factors in reading disability.

Reversal Tendency

The relationship of the occurrence of reversals in reading and writing to achievement in reading has been thoroughly investigated. In some instances it has been considered a cause of difficulty and, in others, a symptom of the specific disability. The latter is probably much closer to the facts.

Mirror reading and writing represent the complete reversal of the word forms. Blom (26), Orton (117), and Tinker (155) have pointed out the tendency for children or adults who evidence this kind of difficulty to have trouble with achievement in reading and writing. Orton (117) also stated that those who have specific reading disability had greater facility in mirror reading than did the normal population. Tinker (155), however, found great individual differences in achievement in mirror reading when he taught it to a group of adults in an attempt to study perceptual processes.

Both Fildes (58) and Orton (118) pointed out that confusion in direction of spatial orientation of similar words was outstanding as a characteristic of the reading disability group. Gates and Bennett (64), Hildreth (82), Monroe (107), Smith (146), Witty and Kopel (175) all agreed that more reversals were made by poor than by good readers.

Several points must be considered in evaluating the fact that reversal errors are more common among low achievers than among high. Most important, of course, is the fact that the same is true of any other type of error. The "good" readers make fewer errors of all kinds than do the "poor" readers. Hildreth (82) mentions that there are no more errors of a reversal type than of any other.

The matters of maturity and training may also influence the frequency of occurrence of reversal errors. Teegarden (153) found that children with kindergarten experience showed less tendency to reverse than did those whose first school experience was in first grade. The tests were made by having children match script or printed forms, or write from memory or by copying. Davidson (40, 41), in her studies of children's reactions to letters confusing because of direction and of reversal errors in attempts to discriminate between certain forms and words, found that as many as 60 percent of children entering school make reversals in dealing with printed symbols. She pointed out that the number of reversals tended to decrease with age. Witty and Kopel (175), reported that the number of reversal errors occurring among poor readers tended to decrease with advancing grade level of the subjects.

Dearborn (42) felt that the dominance patterns were influential in determining the tendency toward reversal. He stated that marked peculiarities of dominance, marked incidence of reversals, and the presence of reading disability were apt to be found together. Gates and Bennett (64) found that the percentage of left-eyed making reversals was greater than the percentage of right-eyed making such errors. However, no real agreement appears to exist on the question of dominance and reversals. Gates and Bennett (64), Hildreth (82), and Witty and Kopel (175) all

reported that handedness was not related to number of reversal errors. Woody and Phillips (176) even found their left-handed group made fewer reversals than did their right-handed group. For purposes of observation of reversal errors, Fildes (58) and Ranschburg (124) both found numbers somewhat more satisfactory material than letters or words. This would seem to be true because, with these materials, the problem becomes one of form discrimination rather than a meaningful activity such as reading. The presence of meaning in the process would tend to lessen the chance of reversal errors.

The following conclusions seem valid:

1. Reversals in visual perception appear to be directly related to immaturity, occurring frequently among children just entering school.
2. Poor readers make more reversal errors than do good readers. This is particularly true because poor readers are frequently forced to try to deal with materials too difficult for them. They are unable to derive meaning from the materials. Thus, errors of all types are very frequent. The reversals, per se, do not destroy the meaning, but may result, at least partially, from a lack of meaning.
3. The reversal errors are, in all probability, not any more common than any other kind of error.
4. The relationship of particular dominance patterns to the tendency to make reversal errors is not entirely clear.

Memory Span

In order to be successful in reading, an individual must be able to deal with oral and printed language symbols. His auditory and visual perception must be adequate to assure his associating meaning with these symbols. In addition he must be able to recall these associations and thus recognize the language symbols. This means that memory and memory span must be considered in relation to reading. Measures of memory span are, in part, measures of attention and concentration (164). Personality deviations which disturb or make impossible concentrated attention, therefore, would tend to decrease the measurable memory span. Relationships between memory span and reading ability, therefore, must be considered in the light of many other factors such as visual and auditory perception and emotional status.

General research on memory and the various measures of memory span has been excellently summarized by Blankenship (25), and Raymond (126). That deficiencies of memory span have a deleterious effect on achievement in reading is a conclusion which appears to be supported by most of the investigations which have been completed in the area. Gray and others (74) have reported that poor auditory memory span frequently leads to difficulty with and confusion in reading. Harris (78: 204) has said:

> Poor memory for sequence of letters, numbers, or words may be found in children of otherwise normal mental ability. If a child's memory span is very short,—for instance, if he can keep in mind a sequence of only three or four letters—he may have difficulty in remembering larger words. This difficulty is especially likely to happen if a sound-blending method or teaching is used. Children with short memory spans usually do better with methods that teach words as units than with letter-by-letter methods.

Monroe and Backus (109) also list lack of success on auditory memory span as indicative of possible difficulty with reading.

Various approaches have been made to investigation of the possible influence of memory span on reading ability. In certain studies the developmental viewpoint has been taken. In others, the relationships between performance on tests of memory span and achievement in reading have been studied. In the third kind of investigation, the interrelationships among the performances on various memory span tests have been investigated.

Saunders (139) worked from the developmental angle. She pointed out that children with short auditory memory span tend to talk at a late age, have speech peculiarities, have difficulty acquiring facility with language, confuse oral directions, encounter difficulty in learning to read, tend to be poor spellers, and to be generally slow in all school progress. She found children with these difficulties to be shy and unassertive, preferring to play alone and tending to become behavior problems, and to evidence immaturity and lack of self-reliance. Saunders concluded that although inadequate auditory memory span is not associated with all disabilities in reading, it invariably leads to difficulty with reading and spelling.

Betts (13) has pointed out, also from the developmental viewpoint, that memory span is a significant factor in readiness for beginning reading. A short auditory memory span is reflected in inability to master word recognition techniques. An adequate memory span is essential to reading success.

Rizzo (131) used the technique of comparing the achievement on tests of memory span in the case of good and poor readers. He found the correlation between scores in reading and the results of the memory span tests "significant at a low level of relationship." (131:234) He also

stated:

> When the comparison between good and poor readers was made in terms of group mean scores on the memory span tests, the scores of the former for all measures exceeded the scores obtained for the latter.

Bond (28), using digits as the material to measure auditory memory span, found significant differences between low and high achievers in reading in memory span for them. Both Anderson (3) and Robinson (133) used isolated speech sounds for the materials to measure memory span. Robinson found that those who had inadequate memory spans for these materials made less progress during the instructional period than did those with satisfactory spans. Anderson did not correlate the results of his tests with those measuring success in reading, but did find success in the tests to be positively related to success in learning foreign languages. Lichtenstein (98) found that among low achievers in reading the auditory memory span for related materials was usually definitely inferior to the general learning ability. However, he did not compare achievement on other measures.

These studies comparing good and poor readers contained no attempt to compare the memory spans for various types of materials or determine the effects of various modes of presentation. Implications were drawn in most cases on the basis of one test. However, Achilles (1: 74) concluded:

> A person who recalls one material well may or may not recall another material well. There is a tendency for the correlation to be positive rather than negative.

Thus the possibility had to be investigated that there might be a significant relationship among findings with tests of memory span employing different types of materials and different modes of presentation.

Brener (30), using many different types of materials, found no significant difference in performance when the presentation was visual and when it was oral. He did, however, find that materials for testing memory span varied in difficulty. In his experiments, digits proved easier to handle and sentences most difficult.

Betts (12:44), as a result of observation of severly retarded readers, found differences where Brener had found none:

> The relationships between memory span findings are being studied as factors in reading disabilities. From the available evidence (admittedly inadequate), it appears that individuals tending toward dyslexia achieve higher scores on auditory span tests of related syllables (i.e., sentences) than they do on visual tests of unrelated letters.

Further investigation of the interrelationships among the results of various tests of memory span was completed by Stauffer (148). He found several significant relationships among test findings for the retarded readers he studied (149:449):

a. Retarded readers achieve significantly higher scores on non-verbal measures of visual memory span than on verbal measures of auditory memory span.

b. Retarded readers tend to achieve higher scores with related items than with unrelated items on verbal measures of memory span.

c. Retarded readers achieve significantly higher scores with non-verbal than with verbal measures of visual memory span.

d. Retarded readers achieve significantly higher scores on forward span tests than on reverse span tests when digits are used to measure auditory memory span.

e. Retarded readers tend to make relatively low scores when related materials are presented arhythmically as measures of memory span.

Investigation of the relationships among memory span findings on achieving readers was completed by Raymond (126). Her population consisted of boys each of whom had an average reading score on a standardized test at least two years higher than his mental age expectancy. She found that they scored significantly high when the presentation was visual than when it was auditory, when the materials were related than when they were unrelated, when digits were to be repeated forward than when they were to be repeated in reverse. The achieving readers did not do better with non-verbal than with verbal materials when both types were used as visual stimuli. They made relatively high scores on related materials presented arhythmically. These data would appear to indicate that certain significant differences between memory span findings on achieving readers and those on retarded readers were revealed by Stauffer (148) and Raymond (126). However, the two groups were not directly comparable.

It would appear, from the available evidence, that inadequate memory span, in itself, can be a causative factor in reading disability or a symptom of some attention defect such as an emotional disturbance. In addition, severely retarded readers are characterized by a tendency toward certain patterns of relative achievement on tests of memory span with varying test materials and modes of presentation. Whether such relationships might exist also among other groups has not been adequately investigated.

Associative Learning Ability

In her study of memory span Achilles (1) found that, for both recall and recognition, the material richest in associations was remembered most easily, but that with few or no associations was poorly remembered. Richness of association is, then, a factor of importance in the kind of retention necessary for reading. More basically, however, the acts of visual perception involved in reading demand that associations exist between meanings derived from experience and word forms. Reading is actually reconstructing the ideas which the word symbols represent. Identification of word forms as symbols of the intended meaning is a process of perception or recognition, forming a new link between symbol and meaning, or recalling a previous association. Acquisition of reading ability, therefore, is impossible if the individual is not able to form percepts, make and retain associations between experience and printed symbols (134).

Both Bronner (31) and Schmitt (140) point out the fact that among otherwise normal children there may be deficiencies in ability to make associations. Betts (12) lists inability to make associations, in spite of adequate general capacity, as one of the primary characteristics of a dyslexia. If there is an associative disorder, if few or no associations are made with printed symbols, the process of perception stimulated by word forms cannot reach its final stage, emergence of meaning. Instead, it is arrested at the stage of awareness of a visual pattern for which meaning must be sought.

Level of operation in perception or ability to form and retain associations must be considered not as an isolated factor which may be related to reading ability but as a factor closely related to others. Relationships between association and memory span have already been indicated. Either may be affected negatively by emotional disturbances which make attention and concentration difficult or impossible. Rapaport (125: 168) has said:

> Attention is considered here an effortless, passive unhampered contact with outside reality—a free receptivity. This free receptivity appears to be hampered if the subject's affects and anxieties are not well-controlled and get out of balance .... In contrast to attention, concentration may be characterized as an active relationship to outside reality. When one finds himself unable to take in freely what the flow of a book, a lecture, or a conversation brings to him, he may exert conscious effort to keep out of consciousness all material that is not directly pertinent. This focusing of consciousness upon the current topic, by exclusion of other emotional or thought content, we shall designate as concentration.

Thus, when emotional aberrations are such that content extraneous to the learning situation cannot be kept out of focus, the ability to make necessary associations or to arrive at the necessary percept will be disturbed. Likewise, inadequate vision or hearing might make the forming of associations between word symbols and meaning difficult or impossible. Doll (48) pointed out that brain lesions or anomalies may bring about the same kind of perceptual disorders.

Disturbances of the ability to make associations may affect reading ability in other ways than in the connection of meaning with a specific word form. Trow (156) pointed out that all reading skills—comprehension, organization, rate of reading, etc., —are either the result of pure associative learning or of associative learning combined with sensorimotor skills. Garrett and Schneck (61) emphasize the fact that the most important test in reading, the comprehension check, is actually a controlled association test.

Gates (62) was aware of the fact that great individual differences exist in associative learning ability. He considered deficiency in this ability a factor in reading disability, and, consequently, felt that there should be means to measure performance in the area. He stated (p. 105):

> Children will differ in their ability to learn by associating a visual stimulus, such as a printed word, with a meaning given orally.

Of the test he devised he said:

> It is not a measure of 'word blindness' but rather of a complex of factors involved in 'associative' or 'associational' learning of the general type involved in reading.

Stauffer (148) investigated the relationship between various sets of findings on associative learning tests and tests of general capacity. He concluded (149:448-49):

1. Significant relationships exist between different associative learning test findings on retarded readers.
   a. Retarded readers tend to achieve significantly higher scores by a visual-auditory mode of presentation than by a visual-visual.
   b. Retarded readers achieve significantly higher scores on geometric test targets than on word-like test targets.
   c. Retarded readers tend to achieve significantly higher scores on tests involving the use of visual, auditory, and voco-motor associations.
   d. Retarded readers tend to achieve significantly higher scores on a verbal test of intelligence than on an oral vocabulary test (verbal opposites).

Raymond's study of achieving readers (126) revealed that they, too, achieved significantly higher scores with visual-auditory presentation than with visual-visual and with geometric figures than with word-like figures. However, the achieving readers made scores on verbal opposites test which were equal to their mental age scores as determined by the Stanford-Binet.

These findings would seem to indicate that the child with a specific reading disability may have difficulty in learning to associate meaning with visual symbols and, particularly, with word forms. A second implication is that although addition of auditory clues facilitates learning somewhat, the visual-auditory clues given in teaching the average child to read may not be sufficient for the child with a specific reading disability. That the introduction of voco-motor clues tends to improve performance in associative learning appears to support this idea. Dr. Grace Fernald (47) apparently recognized this need for additional cues for the establishment and retention of associations when she recommended the use of a word-learning technique which involved visual, auditory, kinaesthetic, and tactile stimulation.

Several conclusions can be drawn from the literature on associative learning. First, ability to form percepts or, specifically, to make associations between experience and visual symbols is a basic factor in learning to read. Second, certain patterns of deficiency in associative learning tend to characterize severely retarded readers. Whether such patterns might exist in normally achieving readers has not been conclusively demonstrated. Third, ability in this area may be disturbed by defects of vision, hearing, or memory, or by emotional aberrations.

Social and Emotional Adjustment

The possible influences of disturbances of attention and concentration on acquisition of reading ability have already been discussed. There are various researches which indicate the deleterious effects on all learning of negative emotional states. Bird (21) found, in a study of children from four to six years of age, that such states were fairly common. Thirty percent of those she studied had personality handicaps that interfered with learning. The children with the least adequate adjustment took twice as many trials for learning as did those with the best adjustment. Fear reactions were especially potent in inhibiting learning. Children in whom such difficulties were present needed as many as three times the trials required for the best adjusted. Carter (35) found that retention was affected by the emotional tone of the learning situation. Castner (36) pointed out that certain negative traits, especially an unstable and excitable personality, tended to predispose to failure in reading, largely through fluctuation of attention. Page (119), likewise, emphasized that the presence of strong emotions prevented the kind of attention necessary for learning to read.

Both Prescott (121) and Lund (101) indicated that the basic needs and satisfactions of the child must be considered. Difficulties may arise when his achievement is in poor relationship to his desires. McClusky (103) stated that the learning of any subject must be considered in terms of the total personality and that this is particularly evident in the research on reading disabilities. Knowing the child for whom remediation of reading disability is being planned does not mean knowing merely the skills or deficiencies in his handling of various language areas. His feelings affect his ability to learn and, consequently, must be investigated. Bell (9) recommends the use of story telling, creative drama, art work, and the like for gaining understanding of the child. Having gained insight into the child's basic personality structure through tests and observations and into his reactions to various situations, the clinician is in a better position to understand his specific difficulties and plan for his wholesome growth.

Increasing attention has been given to the relationships between reading and emotional status. Various authors have summarized the opinions expressed on the significance of these relationships (63, 136, 171, 172, 179). The need for further research, especially that of a controlled nature, is great (7, 63). However, there appears to be at least one point of general agreement. As Stewart (150:415) expresses it:

> Personality disturbances may be causal, concomitant or consequent to read-

ing disability.

Emotional Disorders in the Etiology of Reading Disability—One means which has been used in the attempts to determine the relationship of emotional status to reading disability is the comparison of achieving and retarded readers. Are emotional problems characteristic of retarded readers? Is emotional status a differentiating factor between groups of children succeeding in reading and those having difficulty? Unfortunately, there are certain weaknesses in many of these studies which make it impossible to present conclusive evidence from them. In particular, attention must be given to these points:

First, a clear differentiation was not always made between achieving and retarded readers. Instead, the groups were divided by deciding on a crucial score on a standardized reading test without reference to the level of achievement this represented in terms of capacity. For example, Bennett (10) used teacher report of achievement and standardized tests as criteria of level of reading ability. There was no attempt to get exceptionally good readers. The "achieving readers" were ones whose scores on standardized tests were at or above the grade level. The "poor readers" were, generally speaking, about a year below the grade level. There was no guarantee that some of these poor readers were not actually doing as well as could be expected in terms of their capacities. Likewise, some of the "good readers" may actually have been retarded in view of the fact that they were capable of considerably more. Others, in their studies, used similarly inadequate means of setting up their groups on the basis of reading achievement (60, 97, 133).

Second, variability within the groups was not always adequately treated and compared with the inter-group variability. Gann (60), for example, gave no concentrated attention to the different patterns which she found within her "good" and "poor" reader groups. Instead, she emphasized the differences found between the groups.

Third, certain investigators approached the studies with a definite set for education problems (10, 63, 97), and others with a set for psychological and emotional problems (24, 60). This question of set appeared to lead them to overemphasize the factors of particular interest to them and exclude adequate attention to others.

Fourth, in some cases, only very superficial evaluations of personal adjustment were made (10, 97, 135).

Fifth, there has been no study reported of groups equated on the basis of emotional patterns with an attempt to find whether or not there were similar or different effects of these patterns on achievement in reading.

With these differences in approach to the study of the relationships between emotional adjustment and reading ability, it is natural that quite contradictory results have sometimes been obtained. Bennett (10) found that behavioral or adjustment status did not distinguish between his "good" and "poor" readers. On the other hand, Gann (60) reported that the best differentiating factor she found was personal adjustment. She found that the group of retarded readers even felt that their teachers were less friendly to them than to the achieving group. It is possible that her experimental design rather logically dictated this conclusion of a real difference between the groups. Ladd (97) found that the "good" readers she studied seemed to surpass the "poor" readers in their general feeling of happiness and success in school, in their persistence and self-control, and in ability to get along with others without quarreling. Sheldon and Carrillo (143) found a general dislike of school among the poor readers. Jackson (87:125) concluded:

> Among retarded readers one may expect a larger than chance number of individuals who possess personality traits that deviate considerably below average.

Analysis of the various maladjustments found among the poorer readers studied has led some writers to conclude that certain types of emotional problems may be ones which are basic to failure in reading. Monroe and Backus (109) listed these as emotional factors which probably would be causal in reading difficulty: general immaturity, excessive timidity, prejudice against reading and fear of its difficulty, and predeliction against all school activities. All of these should, more rightly, be considered as symptoms of maladjustment. Challman (37) similarly listed overprotection and consequent immaturity, and insecurity. Jameson (88) emphasized the fact that when the child has already recognized his lack of success, his feelings of inadequacy and insecurity are exaggerated by the intense concern shown by adults about his lack of achievement.

Emotional instability has been considered a causal factor in reading disability (22, 85, 102, 106). This again appears to be labeling without defining the specific emotional difficulty which is present. Hollingworth (85) emphasized the fact that achievement in reading requires close cooperation and concentration, ability to follow directions, and ability to sustain attention. The child who is unstable, excitable, timid, or dreamy has difficulty in exerting effort in the necessary areas. Both Zirbes (178) and Vorhaus (161, 162) also felt that personal maladjustments were major factors in the reading disability cases they considered.

Tulchin (157) pointed out that emotional reac-

tions to reading, predisposing to lack of achievement in that area, may be determined by conditions present in the child's environment before reading was attempted. She felt that reading might be identified by the child as a symbol of growing to fit an accepted pattern, one which he could not bring himself to fall into under the circumstances.

Stewart (150), Vorhaus (161), and Blanchard (24), similarly state that the failure to achieve in reading may, in some cases, be an expression of hostility or guilt, or a means of drawing closer to the parents through anxiety accompanying lack of success in academic work. Blanchard's theory of guilt is expressed thus (24: 410):

> In many instances, the reading disability is a disguised expression of hidden motives, satisfying the need for punishment and relieving guilt by exposing the child to a situation of failure in school and of criticism.

Such manifestations as these would be signs of deep-seated emotional conflicts, and, as Tulchin (157) points out, would lead to difficulties in other areas as well as in reading.

On the other hand, the majority of investigators seem to feel that, although personal maladjustments may be causal factors in reading disability in some cases, the emotional problems may also be a direct result of the failure to achieve in reading. Especially in the earlier considerations of the relationship of personal adjustment to reading disability, the majority opinion appeared to be that failure to achieve in reading was responsible for most of the emotional disturbances observed in the disability cases (37, 65, 89, 113, 118). Wilking (171), in a summary of the research to 1940, concluded that the preponderance of cases of disability in reading responded to a direct educational approach with no real need for psychotherapy. He found a minimum of personal maladjustment and felt that its role as either a causative or contributing factor was far from definitely determined. Gates (63) also felt that clearcut cases of emotional disturbance as primary causal factors in reading disability were exceedingly rare. Fernald (57) presented as evidence that emotional disturbances were most frequently symptomatic of the difficulty in reading the fact that only four of her seventy-eight cases had shown emotional instability before the time they entered school. However, several investigators have concluded that there are frequently emotional problems which are not evident at the time of the original analysis of the cases (24, 85, 144). In such situations they found that it was only after remedial work had been initiated that the subject was able to bring to the fore the personal maladjustment so that the need for psychotherapy became clear. In some cases, the lack of response to the remedial situation was a clear indication of emotional maladjustment and the need for treatment (24).

Sherman (144, 145), Strang (151), Fenton (56), Ridenour (130), and Robinson (132) all pointed out the effects that the frustrations of lack of achievement had on the personal adjustment of pupils. Lack of motivation, resistance to help, excessive fatigue in a reading situation, and other attempts to escape from a disturbing task were evident after pupils had encountered difficulty with reading.

Monroe and Backus (109) felt that certain emotional factors were ones which resulted from reading disability and acted to further retard progress in the area. They listed aggressive opposition, withdrawal, compensating mechanisms, defeatism, and hypertension as characteristic difficulties arising from failure in reading.

Blanchard (24) has expressed an opinion with which others seem to concur. In addition to the evidence that emotional disturbances can either cause or result from reading disability, there is evidence that both may arise from a common cause. In many cases, determination of causal relationships is extremely difficult.

Influence of Home Life—Robinson (133) considered one of the unique contributions of her study to be the evidence given of the overwhelming influence of the home on achievement in reading. She stated (113:222):

> Maladjusted homes or poor interfamily relationships were found to be contributing causes in 54.5 % of the cases studied.

The insecurity, fears, and worries which accompanied poor home relationships seemed to militate against success in reading.

Difficulties arising in the home are not always recognized at first in the consideration of a child's problem with reading. Once suspected, they may be difficult to attack. Blanchard (24:396) pointed out factors which may be responsible for this situation:

> The unconscious wish of the parent to see a child's difficulty with reading as primarily educational rather than emotional is not hard to understand. The former implies a problem in the child's relationship to the school; the latter may lead to the parent's beginning to question his own relationship to the child and to the need to do something about it.

Ephron (53) has suggested that frequently it is possible to get help for the child, in the emotional area, only by bringing in psycho-therapists

to the staffs of reading clinics. The parents, she feels, will bring the children for help in reading even when they cannot face the fact that psychological or psychiatric help may be needed.

The evidence rather definitely, however, points to the fact that the influence of the home is strong in determining a child's ability to succeed in reading. Gann (60), Hincke (83), Missildine (106), Preston (122, 123), Stewart (150), and Witty (172) all stress the importance of parent-child and of sibling relationships. Hincks (83) found that where the emotional problems were deeply imbedded in the family life, they tended to persist even when some improvement in reading was effected. Preston (122) stressed the injustice of placing blame on the child, making disagreeable comparisons, removing privileges, and evoking physical punishment for failure. She pointed out that the great concern and tenseness of the parents, combined with these other unfortunate reactions, were extremely destructive of the child's security. Missildine (106) found similar reactions among the parents of the boys she studied.

Emotional Status and Remedial Work—Depending on the particular emotional difficulty will be the decision as to whether specific therapy may be necessary before or concurrent with the remedial work in reading (24, 57, 83, 87, 152, 178). There have been differences of opinion on the need for special therapy and its effect on reading ability. Axline (6), in an investigation of thirty-seven below average readers in the second grade, found that play therapy with no remedial work in reading was effective in bringing gains in both personal adjustment and reading. The significance of these gains was not adequately determined. Damreau (39) studied twenty-two cases of reading disability, all of them having personality problems. She did not find that alleviation of one problem necessarily helped materially with the alleviation of the other. Hincks (83) found that, except in certain cases in which the emotional problems were especially deep-seated, improvement in behavior accompanied improved reading ability. The majority opinion appears to be that when gains are achieved in one area, they also occur in the other. Really effective treatment must be planned in terms of the child's personal adjustment. Through the treatment, alleviation of both the personal maladjustments and the specific difficulties in reading must be sought. When treatment in the two areas is being given by separate individuals, cooperation between them must be close (170). As Ellis has stated (52: 61):

> It was concluded that both educational factors seem to be of vital importance in the etiology of reading disabilities, and that the most effective attack upon them must be made on a concerted educational-emotional basis.

Sherman has stated (144:134) that the first step in the planning of the remedial program must be a thorough understanding of the child's emotional status:

> No therapeutic plan can be formulated without first reorganizing a child emotionally and, second, ... consistent motivation for improvement cannot be introduced if the child is distracted by personal problems. The eagerness of the therapist to institute a direct remedial program often retards rather than accelerates the progress.

As Hardwick (86) and others have concluded, if the personality problem is basic to reading failure, it must be treated before real gains can be expected. On the other hand, if the personal maladjustment has resulted from frustrations in learning to read, some success must be achieved before the emotional disorders will be alleviated. Burfield (33), Robinson (132), and Hollingworth (85) pointed out that, as the severity of emotional problems increases, the necessity for individual rather than group instruction becomes stronger.

Gellerman (67) stressed another point of importance in the matter of emotions and the remedial process. The longer the difficulties are allowed to continue without correction the more serious they become. Orton (118) felt that a child with good intelligence and normal development aside from the reading problem should not be allowed to go into his second year of schooling without at least examination to determine the advisability of special treatment. He felt that this kind of attention would help to guard against the accumulation of problems, emotional and academic.

Challman (37) has listed these as essential points in treating any remedial case, but especially in dealing with the emotionally maladjusted: a good start, in a pleasant and brief first session; the arousal of interest; placing of work in the sphere of play; emphasis on success to rebuild confidence; a leisurely pace and plenty of time; the enlistment of cooperation from the parents. Practices to be avoided are these: having remedial work replace a favorite activity; employing after school time; exerting pressure for achievement; using books designated for certain levels; causing embarrassment or stigma to be attached to the work. Schubert (141) makes similar recommendations.

Conclusions—Studies of the relationships between emotional adjustment and reading disabil-

ity have been made by many individuals. Certain weakness of these studies, considered at the beginning of the section, make it impossible to state definitely the part which emotions play in reading disability and the effect of reading disability on the personality organization. Certain general conclusions, however, seem sound.

First, there is no single personality trait or combination of traits which is invariably associated with either success or failure in reading. Variability of personality structure, according to the existing evidence, will probably be great within groups of either achieving or retarded readers.

Second, personal maladjustments which lead to inability to attend and concentrate will, in all probability, have a negative effect on the development of reading ability.

Third, the presence of many or very serious symptoms of personal maladjustment is more frequently associated with failure in reading than with success in reading.

Fourth, emotional problems and reading disability, when they occur together, are apt to aggravate each other. Both must be considered in the alleviation of the total problem.

Fifth, the influence of home conditions is strong in determining both the personal adjustment and achievement in reading.

Sixth, the more basic and severe the emotional problem, the greater is the likelihood that individual instruction will be necessary and that psychotherapy will have to either precede or accompany remedial instruction.

Summary

In choosing studies and opinions to be reviewed, those designed to determine the relationships between intelligence and reading ability were omitted because this study was concerned only with children in at least the normal range of the general American population in general capacity. An attempt was made to find literature related to factors which might cause or contribute to reading disability among those not held back by inadequate general capacity.

Certain weaknesses limit the data obtained from the studies reviewed. First, in many cases, there was no adequate definition of "good" and "poor" readers with consideration given to level of general capacity. Second, the methods of rating or measuring specific factors studied was not always adequate. Third, in many studies no attempt was made to study comparative intra-group and inter-group variability. Fourth, emphasis was sometimes placed on one factor or viewpoint to the virtual exclusion of others. Fifth, there are insufficient data available, in some areas, on the normal population to allow evaluation of the significance of results obtained on retarded readers.

Definition of "good" and "poor" readers in the groups to be studied varied considerably and, therefore, results are not directly comparable. In most of the studies reviewed, comparison was not actually made of retarded and achieving readers and their status in certain areas. The relative rank in the group was more often a criterion of placement than was the relationship between the child's present achievement level and his capacity for achievement. Group, verbal-type tests of intelligence were sometimes used as the only measure of capacity. Thus the actual capacity of some of the pupils may never have been determined adequately for comparison with the present achievement level.

Lack of specificity in measuring or rating can be illustrated from several studies. In one instance (176), measurement of reading ability was by teacher rankings on a five-point scale, "often with the aid of standardized tests." In another (64), some conclusions on vision were drawn merely on the basis of whether or not the children were wearing corrections. Gaines (59) evaluated studies on the relationships between speech and reading and concluded that ratings of speech functioning were inadequate. In studying social and emotional adjustment, in some cases (e.g.97) very superficial subjective judgments based on observation were the only criteria. Conclusions drawn in individual studies, therefore, must be considered only very tentatively and cannot, with any degree of confidence, be compared with those drawn from other apparently related investigations.

Emphasis has too often been placed on apparent differences between groups without adequate investigation of the variability with the groups. Thus, conclusions which are drawn imply closer association of certain factors with reading disability than is actually indicated by the results. Indications of certain personal maladjustments, for example, were present in the "good" as well as "poor" reader (60), but the tendencies toward differences in the groups were emphasized and these variations within the groups not emphasized.

Special interests of investigators have, in many cases, led to study of one factor or manifestation of difficulty without adequate attention to others. Emphasis on problems of dominance (42), certain personality characteristics (60), or vision (49) has led, in certain studies, to overemphasis on the influence of these factors and to almost a "one-factor type" theory of causation.

After data have been obtained on the status of disability of cases in a particular area, it has been impossible at times to determine whether or not they were different from the normal population or from groups of achieving readers.

There is a great need for normative data for use as a standard of comparison in certain areas. For example, in the area of speech, emotional status, memory span, association, or "central" dominance certain data have been obtained on reading disability cases. However, similar data have not been obtained on large or carefully selected and stratified samples of non-disability cases. Conclusions, therefore, about the relationships of these factors to reading disability must still be very tentative.

Within these limitations, however, certain conclusions can be drawn about the relationship of some factors to reading disability. At present a multiple-factor theory of causation, in which the specific factors studied might have a part, seems most logical.

In the past, specific disabilities have been considered traceable to destruction or maldevelopment of brain tissue (84,112), to loss of certain specialized determinants in the germ plasm (138), to malfunction of certain brain areas (57, 118, 123), and to results of birth injuries (2, 69, 78, 90). Many of these theories arose from comparison with cases of acquired reading disability. Although there are similarities in the two types of cases in that the reading disability seems always to be accompanied by disturbances in other language functions (57, 70, 72, 79, 80, 118, 169), no one of the theories advanced appears adequate to account for all cases of reading disability. Hence, investigators have sought to determine the relationships between the factors which follow and reading disability.

Visual Functioning

Because of differences in definition of reading disability and in the measurement of adequacy of visual functioning, widely varying results have been obtained on the possible importance of vision as a causal or contributing factor in reading disability. With the limitations thus placed on the combined data, only a few conclusions seem tenable. First, many visual problems existing in cases of reading disability cannot be considered factors which cause or contribute directly to the difficulty (49, 107, 133, 173). Second, although visual acuity or the presence of refractive errors is probably not directly related to reading ability (49, 107, 173), lack of adequate coordination in the functioning of the two eyes probably contributes to reading disability (15, 49, 173). Third, although visual functioning and reading achievement are not directly related, the detection and correction of visual difficulties may enhance comfort and efficiency in reading (18).

Auditory Functioning

Inadequate discrimination between retarded and achieving readers again limits the conclusiveness of the results. However, it can tentatively be concluded that no direct, significant relationship exists between auditory acuity and reading achievement (54, 81, 94, 133) except that high frequency losses and low achievement in reading appear to be rather directly related (16, 81, 96). Second, poor auditory discrimination, inadequate ability to detect likenesses and differences in sounds, appears to be rather definitely related to and possibly a causative factor in reading disability (28, 54, 92, 94, 107, 133, 138).

Speech and Language Development

Loose ratings of speech performance and failure to consider general capacity in evaluating adequacy of reading achievement levels limit the results of studies of the relationships between the two. In view of this fact, only two points seem conclusively supported at this time. First, speech disabilities and reading disability may result from a common cause (4, 50, 77, 107, 133, 158). Second, because of the sequence of language development, difficulty in oral language development may affect adversely the development of reading ability (4, 8, 10, 50, 59, 70, 86, 158).

Dominance

"Central" Dominance—There appears to be adequate evidence that language functions can be disturbed by malfunctioning of certain areas of the brain in the dominant hemisphere, usually the side opposed to the dominant hand (38, 70, 110, 114, 146, 166). Present inadequate evidence, using tests which involve bimanual production of certain patterns (159), suggests that there may be a positive relationship between confusion in "central" dominance and specific reading disability (146).

Peripheral Dominance—Ratings of lateral preference in peripheral activities have not always been adequate nor have the investigator's ratings of achievement in reading given adequate attention to level of general capacity. In addition, this factor has sometimes been emphasized unduly because of special interests of the investigators. Only two conclusions seem reliable in view of the limitations of the studies. First, neither hand nor eye preference appears to be, in itself, a significant factor in reading disability (2, 10, 55, 62, 64, 65, 133, 146, 176). Second, preference for one hand and the opposite eye is probably not a significant factor in itself (55, 57, 65,

146), but may be indicative of some more basic problem.

Reversal Tendency

The presence or absence of reversal errors has been investigated in such a way that its relationship to low achievement rather than retardation and to maturity has been demonstrated. Several conclusions from the studies seem perfectly reliable. First, although the number of reversal errors is closely related to difficulty in reading (26, 42, 58, 64, 82, 107, 115, 116, 118, 146, 155, 173), they are no more common than errors of any other type (82). When reading material is above a suitable level, meaning is destroyed and errors of all kinds become numerous. Second, reversals in visual perception appear to be directly related to immaturity, occurring frequently among children just entering school (40, 41, 153, 175). Third, in spite of conflicting evidence, there appears to be no direct relationship between lateral preference in peripheral activities and frequency of reversal errors (64, 82, 175, 176).

Memory Span

Conclusions on the relationship of memory span to acquisition of reading ability have, in many studies, been made without adequate attention to type of material or mode of presentation used in the tests. In two studies (126, 148) relationships among memory span findings, with attention to these factors, were investigated. From the available evidence, two major conclusions seem tenable. First, deficiencies in memory span, in themselves or as symptoms of difficulties such as deficiencies in attention, have a deleterious effect on learning generally and acquisition of reading ability in particular (13, 28, 74, 78, 109, 131, 133, 139). Second, children with specific reading disabilities are characterized by certain patterns of relative achievement in memory span. Based on present evidence, the following appear to be characteristic of severely retarded readers: visual span for non-verbal materials superior to auditory span for verbal materials; auditory span for related materials superior to auditory span for unrelated materials; visual span for non-verbal materials superior to visual span for verbal materials; ability to repeat digits forward superior to ability to repeat digits in reverse order; relatively short auditory span for verbal materials presented arhythmically (12, 148).

Associative Learning Ability

In order for the process of perception stimulated by word forms to reach its conclusion in the emergence of meaning, associations between meaning and the visual form must be made and retained. Investigation of this associative learning ability has not been extensive. However, from the literature in the field, certain conclusions can be drawn. First, deficiencies in associative learning may exist in individuals who are otherwise normal, and may lead to difficulty with reading (12, 31, 62, 140). Second, certain relationships among results of associative learning tests appear to be characteristic of severely retarded readers. The following are characteristic of these cases: achievement with a visual-auditory presentation superior to achievement with a strictly visual presentation; greater difficulty with forming associations with word-like figures than with geometric figures; improvement in ability to make associations when vocomotor clues are added to the visual and auditory; achievement on a verbal opposites test below the mental age level established by a verbal test of intelligence (12, 148, 149). Certain of these same characteristics appear in achieving readers, however (126). Third, disturbance of attention and concentration may affect ability in this area.

Social and Emotional Adjustment

In studies of the relationships between personal adjustment and reading disability, certain weaknesses have limited the validity of the results. The inadequate measurement of reading achievement and of emotional status, the failure to consider the similarities in as well as differences between groups of different levels of adequacy in reading, and the poor experimental design of some of the studies makes it impossible to state definitely the part which emotions play in reading disability and the effect of reading disability on personality organization. Six general conclusions seem sound, however.

First, there is no single personality trait or combination of traits which is invariably associated with either success or failure in reading. Variability of personality structure, according to the existing evidence, will probably be great within groups of either achieving or retarded readers (10, 63, 136, 149).

Second, personal maladjustments which lead to inability to attend and concentrate will, in all probability, have a negative effect on the development of reading ability (21, 35, 36, 119, 125).

Third, the presence of many or very serious symptoms of personal maladjustment is more frequently associated with failure in reading than with success in reading (22, 63, 87, 178).

Fourth, emotional problems and reading disability, when they occur together, are apt to aggravate each other. Both must be considered in the alleviation of the total problem (22, 24, 52, 57, 67, 83, 87, 152, 170, 178).

Fifth, the influence of home conditions is strong in determining both the personal adjustment and achievement in reading (60, 83, 96, 106, 122, 123, 133, 149, 172).

Sixth, the more basic and severe the emotional problem, the greater is the likelihood that individual instruction will be necessary and that psychotherapy will have to either precede or accompany remedial instruction (23, 24, 33, 85, 132, 144).

BIBLIOGRAPHY

1. Achilles, Edith Mulhale. "Experimental Studies in Recall and Recognition," Reprinted from Archives of Psychology, No. 44 (Lancaster, Pa.: New Era Printing, Co., 1920).
2. Anderson, M., and Kelley, M. An Inquiry into Traits Associated with Reading Disability," Smith College Studies in Social Work, II (1931-32), pp. 46-63.
3. Anderson, V. A. "Auditory Memory Span as Tested by Speech Sounds," American Journal of Psychology, LII (January 1939), pp. 95-99.
4. Artley, A. Sterl. "A Study of Certain Factors Presumed to be Associated with Reading and Speech Difficulties," Journal of Speech and Hearing Disorders, XIII (December 1948), pp. 351-60.
5. _____. "Oral Language Growth and Reading Ability," Elementary School Journal, LIII (February 1953), pp. 321-28.
6. Axline, Virginia M. "Nondirective Therapy for Poor Readers," Journal of Consulting Psychology, XI (March-April 1947), pp. 61-69.
7. _____. "Treatment of Emotional Problems of Poor Readers by Nondirective Therapy," in Clinical Studies in Reading I, Supplementary Educational Monograph, No. 68 (Chicago: University of Chicago Press, 1949), pp. 141-53.
8. Beckey, Ruth E. "A Study of Certain Factors Related to Retardation of Speech," Journal of Speech Disorders, VII (September 1942), pp. 223-49.
9. Bell, J. E. "Emotional Factors in the Treatment of Reading Difficulties," Journal of Consulting Psychology, IX (May-June 1945), pp. 128-31.
10. Bennett, Chester C. An Inquiry into the Genesis of Poor Reading, Contributions to Education, No. 755 (New York: Bureau of Publications, Teachers College, Columbia University, 1938).
11. Best, C. H., and Taylor, N. B. The Physiological Basis of Medical Practice (Baltimore: Williams and Wilkins Co., 1945).
12. Betts, Emmett A. "Classification of Reading Disabilities," Visual Digest, IX (Summer 1945), pp. 36-44.
13. _____. Foundations of Reading Instruction (New York: American Book Co., 1950).
14. _____. "Inter-relationship of Reading and Spelling," Elementary English Review, XXII (January 1945), pp. 13-23.
15. _____. "A Physiological Approach to the Analysis of Reading Disabilities," Educational Research Bulletin, XIII (September and October 1934), pp. 135-40; 163-74.
16. _____. "Reading Problems at the Intermediate Grade Levels," Elementary School Journal, XL (June 1940), pp. 737-46.
17. _____. Spelling Vocabulary Study (New York: American Book Co., 1940).
18. _____, and Austin, A. S. Visual Problems of School Children, reprinted from Optometric Weekly (Chicago: Professional Press, 1940-41).
19. Bills, Robert E. "Nondirective Play Therapy with Retarded Readers," Journal of Consulting Psychology, XIV (April 1950), pp. 140-49.
20. _____. "Play Therapy with Well-Adjusted Retarded Readers," Journal of Consulting Psychology, XIV (August 1950), pp. 246-49.
21. Bird, Grace E. "Personality Factors in Learning," Personnel Journal, VI (June 1927), pp. 56-59.
22. Blanchard, Phyllis. "Psychoanalytic Contributions to the Problems of Reading Disabilities," Psychoanalytic Study of the Child, II (1946), pp. 163-87.
23. _____. "Psychogenic Factors in Some Cases of Reading Disability," American Journal of Orthopsychiatry, V (October 1935), pp. 361-74.
24. _____. "Reading Disabilities in Relation to Difficulties of Personality and Emotional Development," Mental Hygiene, XX (July 1936), pp. 384-413.
25. Blankenship, Albert B. "Memory Span: A Review of the Literature," Psychological Bulletin, XXXV (January 1938), pp. 1-25.
26. Blom, E. C. "Mirror Writing," Psychological Bulletin, XXV (1928), pp. 582-94.
27. Boland, John L., Jr. "Type of Birth as Related to Stuttering," Journal of Speech and Hearing Disorders, XVI (March 1951), pp. 40-43.
28. Bond, Guy L. The Auditory and Speech Characteristics of Poor Readers, Contributions to Education, No. 657 (New York: Bureau of Publications, Teachers College, Columbia University, 1935).
29. Borish, Irving M. Clinical Refraction (Chicago: Professional Press, 1949).
30. Brener, Roy. An Experimental Investiga-

tion of Memory Span, private edition reprinted from Journal of Experimental Psychology, XXVI, May 1940 (Chicago: University of Chicago Libraries).
31. Bronner, Augusta. The Psychology of Special Abilities and Disabilities (Boston: Bobbs-Merrill Co., 1917).
32. Brown, Fred. Manual, Brown Personality Inventory for Children (New York: Psychological Corporation).
33. Burfield, Leone M. "Emotional Problems of Poor Readers Among College Students," in Clinical Studies in Reading I, Supplementary Educational Monograph, No. 68 (Chicago: University of Chicago Press, 1949).
34. Burt, C. Mental and Scholastic Tests (London: P. S. King and Son, 1921), pp. 269-95.
35. Carter, Harold D. "Emotional Correlates of Errors in Learning," Journal of Educational Psychology, XXVII (January 1936), pp. 55-67.
36. Castner, B. M. "Prediction of Reading Disability Prior to First Grade Entrance," American Journal of Orthopsychiatry, V (October 1935), pp. 375-87.
37. Challman, R. "Personality Maladjustment and Remedial Reading," Journal of Exceptional Children, VI (October 1929), pp. 9-10.
38. Chesher, E. C. "Some Observations Concerning the Relation of Handedness to the Language Mechanism," Bulletin of the Neurological Institute of New York, IV (1936), pp. 556-62.
39. Damereau, Ruth. "Influence of Treatment on the Reading Ability and Behavior Disorders of Reading Disability Cases," Smith College Studies in Social Work, V (December 1934), pp. 160-83.
40. Davidson, Helen P. "A Preliminary Study to Determine the Extent to Which Unselected Young Children Make Reversal Errors," Journal of Genetic Psychology, XLV (December 1934), pp. 452-64.
41. _____. "A Study of the Confusing Letters B, D, P, and Q," Journal of Genetic Psychology, XLVII (1935), pp. 458-68.
42. Dearborn, Walter F. "Structural Factors Which Condition Special Disability in Reading," in Proceedings and Addresses of the Fifty-Seventh Annual Session of the American Association on Mental Deficiency (May-June 1933), pp. 268-286.
43. Diller, Juliet C. "The Sex Factor in Enuresis," Journal of Child Psychiatry, II (1951), pp. 194-204.
44. Doll, Edgar A. Manual for the Vineland Social Maturity Scale (New York: Educational Test Bureau, 1953).
45. _____. "Varieties of Slow Learners," Exceptional Child, XX (November 1953), pp. 61-64, 86.
46. Downey, June E. "Types of Dextrality and Their Implications," American Journal of Psychology, XXXVIII (June 1927), pp. 317-67.
47. Duke-Elder, Sir Stewart. The Practice of Refraction (Philadelphia: P. Blakiston's Sons and Co., 1938).
48. Dvorine, Israel. Theory and Practice of Analytical Refraction and Orthophis. Baltimore: Franch-Bray Printing Co., 1948).
49. Eames, Thomas H. "A Comparison of Ocular Characteristics of Unselected and Reading Disability Cases," Journal of Educational Research, XXV (March 1932), pp. 211-15.
50. _____. "The Relationship of Reading and Speech Difficulties," Journal of Educational Psychology, XLI (January 1950), pp. 51-55.
51. Edson, William H., and others. "Relationships Between Visual Characteristics and Specific Silent Reading Abilities," Journal of Educational Research, XLVI (February 1953), pp. 451-57.
52. Ellis, Albert. "Results of a Mental Hygiene Approach to Reading Disability Problems," Journal of Consulting Psychology, XIII (February 1949), pp. 56-61.
53. Ephron, Beulah Kanter. Emotional Difficulties in Reading (New York: Julian Press, 1953).
54. Ewers, Dorothea W. F. "Relations Between Auditory Abilities and Reading Abilities: A Problem in Psychometrics," Journal of Experimental Education, XVIII (March 1950), pp. 239-62.
55. Fendrick, Paul. Visual Characteristics of Poor Readers, Contributions to Education, No. 656 (New York: Bureau of Publications Teachers College, Columbia University, 1935).
56. Fenton, Norman. Mental Hygiene in School Practice (Stanford, California: Stanford University Press, 1943).
57. Fernald, Grace M. Remedial Techniques in Basic School Subjects (New York: McGraw-Hill Book Co., 1943).
58. Fildes, L. G. "A Psychological Inquiry into the Nature of the Condition Known as Congenital Word-Blindness," Brain, XLIV (1921-22), pp. 286-307.
59. Gaines, F. P. "Interrelations of Speech and Reading Disabilities," Quarterly Journal of Speech, XXVII (1941), pp. 104-10.
60. Gann, Edith. Reading Difficulty and Personality Organization (New York: King's Crown Press, 1945).
61. Garrett, H. E., and Schneck, M. R. Psycho-

logical Tests, Methods and Results (New York: Harper and Brothers, 1933).
62. Gates, A. I. Improvement of Reading, revised (New York: Macmillan Co., 1947).
63. _____. "The Role of Personality Maladjustment in Reading Disability," Journal of Genetic Psychology, LIX (September 1941), pp. 77-83.
64. _____, and Bennett, C.C. Reversal Tendencies in Reading (New York: Bureau of Publications, Teachers College, Columbia University, 1933).
65. _____, and Bond, Guy L. "Failure in Reading and Social Maladjustment," Journal of the National Education Association, XXV (October 1936), pp. 205-6.
66. _____, "Relation of Handedness, Eye-Sightedness and Acuity Dominance to Reading," Journal of Educational Psychology XXVII (1936), pp. 450-56.
67. Gellerman, Saul W. "Causal Factors in the Reading Difficulties of Elementary-School Children," Elementary School Journal, XLIX (May-June 1949), pp. 523-30.
68. Gens, George W, and Bibey, M. Lois. "Congenital Aphasis: A Case Report," Journal of Speech and Hearing Disorders, XVII (March 1952), pp. 32-8.
69. Gesell, Arnold, and Amatruda, Catherine S. Developmental Diagnosis: Normal and Abnormal Child Development (New York: Paul B. Hoeber, Inc., 1947).
70. Goldstein, Kurt. Languages and Language Disturbances (New York: Grune and Stratton, 1948).
71. Goodenough, Florence. The Measurement of Intelligence by Drawing (Yonkers-on-Hudson, N.Y.: World Book Co., 1926).
71a. Graham, E. Ellis. "Wechsler-Bellevue and Wisc Scattergrams of Unsuccessful Readers," Journal of Consulting Psychology, XVI (August 1952), pp. 268-271.
72. Granich, Louis. Aphasia, A Guide to Retraining (New York: Grune and Stratton, 1947).
73. Gray, William S. Summary of Investigations Relating to Reading, Supplementary Educational Monographs, No. 28 (Chicago: University of Chicago Press, 1925).
74. _____, et al. Remedial Cases in Reading: Their Diagnosis and Treatment, Supplementary Educational Monographs, No. 22 (Chicago: University of Chicago Press, 1922).
75. Haefner, Ralph. The Educational Significance of Left-Handedness, Contributions to Education, No. 360 (New York: Bureau of Publications, Teachers College, Columbia University, 1929).
76. Hardwick, Rose S. "Types of Reading Disability," Childhood Education, VIII (April 1932), pp. 423-27.
77. Harris, Albert J. Harris Tests of Lateral Dominance, Manual of Directions for Administration and Interpretation (New York: The Psychological Corporation, 1947).
78. _____. How to Increase Reading Ability, revised (New York: Longmans, Green and Co., 1948).
79. Head, Henry. "Aphasis: An Historical Review," Brain (1920), pp. 87-165.
80. Henry, Sybil. "Children's Audiograms in Relation to Reading Attainment," Journal of Genetic Psychology, LXX (1947), pp. 211-31.
81. _____. Aphasia and Kindred Disorders of Speech, Vol. I (Cambridge, Mass.: Harvard University Press, 1926).
82. Hildreth, Gertrude. "Reversals in Reading and Writing," Psychological Bulletin, XXX (1933), pp. 670-671.
83. Hincks, E. Disability in Reading in Relation to Personality, Harvard Monographs in Education, No. 7, Series 1, Vol. II (Cambridge, Mass.: Harvard University Press, 1926).
84. Hinshelwood, J. Congenital Word-Blindness (London: H. K. Lewis and Co., Ltd., 1917).
85. Hollingworth, Leta S. "Reading," in Special Talents and Defects (New York: Macmillan Co., 1923), Ch., IV.
86. Huber, Mary. "Re-education of Aphasics," Journal of Speech Disorders, VII (December 1942), pp. 289-93.
87. Jackson, Joseph. "A Survey of Psychological, Social, and Environmental Differences Between Advanced and Retarded Readers," Pedagogical Seminary and Journal of Genetic Psychology, LXV, first half (September 1944), pp. 113-31.
88. Jameson, Augusta. "Methods and Devices for Remedial Reading," in W. S. Gray (Editor) Recent Trends in Reading, Supplementary Educational Monographs, No. 49 (Chicago: University of Chicago Press, 1939), pp. 170-78.
89. Jastak, Joseph. "Interferences in Reading," Psychological Bulletin, XXXI (April 1934), pp. 244-272.
90. Jensen, M. B. "Reading Deficiency as Related to Cerebral Injury and to Neurotic Behavior," Journal of Applied Psychology, XXVII (1943), pp. 535-45.
91. Johnston, Philip W. The Relation of Certain Anomalies of Vision and Lateral Dominance to Reading Disability, Monograph of the Society for Research on Child Development, VII, No. 2 (Washington, D.C.: Society for Research in Child Development, National Research Council, 1942).
92. Jones, Morris Val. "The Effect of Speech Training on Silent Reading Achievement,"

Journal of Speech and Hearing Disorders, XVI (September 1951), pp. 258-63.
93. Jones, W. Franklin. A Study of Handedness (Los Angeles: University of Southern California, 1918).
94. Kennedy, Helen. "A Study of Children's Hearing as it Relates to Reading," Journal of Experimental Education, X (June 1942), pp. 238-51.
95. Kirk, Samuel A., and Kolstoc, Oliver P. "The Mentally Retarded," in Review of Educational Research, XXIII (December 1953), Ch. II.
96. Kunst, Mary S. "Psychological Treatment in Reading Disability," in Clinical Studies in Reading I, Supplementary Educational Monograph, No. 68 (Chicago: University of Chicago Press, 1949), pp. 133.
97. Ladd, Margaret R. The Relation of Social, Economic and Personal Characteristics to Reading Ability, Contributions to Education, No. 582 (New York: Bureau of Publications, Teachers College, Columbia University, 1933).
98. Lichtenstein, Arthur. "An Investigation of Reading Retardation," Journal of Genetic Psychology, LII (1938), pp. 407-23.
99. Lodge, William J. "Developmental Characteristics of Childhood Related to Language Arts Curriculum," Elementary English, XXX (February 1953), pp. 106-115, 122.
100. Lord, E. E., and others. Special Disabilities in Learning to Read and Write, Harvard Monograph in Education, Series I, Vol. II, No. 1 (Cambridge, Mass: Graduate School of Education, Harvard University, 1925).
101. Lund, Frederick H. Emotions (New York: Roland Press, 1939).
102. McCallister, James M. "Character and Causes of Retardation in Reading Among Pupils of the Seventh and Eighth Grades," Elementary School Journal, XXXI (September 1930), pp. 35-43.
103. McClusky, Howard Y. "Mental Health in School and Colleges," Review of Educational Research, XIX (December 1949), pp. 405-412.
104. Malone, Anthony J., and Massler, Maury. "Index of Nail-Biting in Children," Journal of Abnormal and Social Psychology, XLVII (April 1952), pp. 193-202.
105. May, Charles H. Manual of the Diseases of the Eye (Baltimore: William Wood and Co., 1934).
106. Missildine, W. H. "The Emotional Background of Thirty Children with Reading Disability with Emphasis on Its Coercive Elements," The Nervous Child, V (July 1946), pp. 263-72.
107. Monroe, Marian. Children Who Cannot Read (Chicago: University of Chicago Press, 1932).
108. _____. "Methods for Diagnosis and Treatment of Cases of Reading Disability," Genetic Psychological Monographs, IV (1928), pp. 335-456.
109. _____, and Backus, Bertie. Remedial Reading (Boston: Houghton Mifflin Co., 1937).
110. Morgan, C. T., and Stellar, E. Physiological Psychology (New York: McGraw-Hill Book Co., 1950).
111. Morgan, John. "Disorders of Sensation," in The Psychology of Abnormal People (New York: Longmans, Green and Co., 1928), Ch., II.
112. Morgan, W. Pringle. "A Case of Congenital Word-Blindness," British Medical Journal, II (November 1896), p. 1612.
113. Newell, Nancy. "For Non-Readers in Distress," Elementary School Journal, XXXII (March 1931), pp. 183-95.
114. Nielson, J. M. Agnosia, Apraxia, Aphasia, Their Value in Cerebral Localization, revised (New York: Hoeber, 1946).
115. Orton, S. T. "Certain Failures in the Acquisition of Written Language: Their Bearing on the Problem of Cerebral Dominance," Archives of Neurology and Psychiatry, XXII (1929), pp. 841-50.
116. _____. "An Impediment to Learning to Read, A Neurological Explanation of the Reading Disability," School and Society, XXVIII (1928), pp. 286-90.
117. _____. "A Physiological Theory of Reading Disability and Stuttering in Children," New England Journal of Medicine, CXCIX (1928), pp. 1046-52.
118. _____. Reading, Writing and Speech Problems in Children (New York: W. W. Norton and Co., 1937).
119. Page, James D. "Emotional Factors in Reading Disabilities," Education, LXXII (May 1952), pp. 590-95.
120. Phillips, A. "Six Cases of Dyslexia," Psychological Clinic, XIX (1930-31), pp. 185-200.
121. Prescott, Daniel A. Emotion and the Educative Process (Washington, D. C.: American Council on Education, 1938).
122. Preston, Mary I. "The Reaction of Parents to Reading Failure," Child Development, X (September 1939), pp. 173-79.
123. _____. "Reading Failure and the Child's Security," American Journal of Orthopsychiatry, X (April 1940), pp. 239-52.
124. Ranschburg, P. Die Lese-und Schreibstoringen des Kindesalters (Halle a S.: Marhold, 1928).
125. Rapaport, David. Diagnostic Psychological Testing, Vol. I (Chicago: Year Book

Publishers, Inc., 1946).
126. Raymond, Dorothy MacLean. Performance of Reading Achievers on Memory Span and Associative Learning Tests, Ph.D. dissertation, Temple University, Philadelphia, 1952.
127. Reynolds, M. C. "A Study of the Relationships Between Auditory Characteristics and Specific Silent Reading Abilities," Journal of Educational Research, XLVI (February 1953), pp. 439-49.
128. Richards, T. W. "A Case of Reading Disability Due to Deficient Visual Imagery," Psychological Clinic, XX (1931-32), pp. 120-24.
129. _____. "A Clinical Study of a Severe Case of Reading Disability in a Left-Handed Child Who was Taught to Read by a Combined Grapho-Motor and Voco-Motor Method," Psychological Clinic, XIX (1930-31), pp. 285-90.
130. Ridenour, Nina. "The Treatment of Reading Disability," Mental Hygiene, XIX (1935), pp. 387-97.
131. Rizzo, N. D. "Studies in Visual and Auditory Memory Span with Special References to Reading Disability," Journal of Experimental Education, VIII (December 1939), pp. 208-44.
132. Robinson, Helen M. "Emotional Problems Exhibited by Poor Readers, Manifestations of Emotional Maladjustment," in Clinical Studies in Reading I, Supplementary Educational Monograph, No. 68 (Chicago: University of Chicago Press, 1949).
133. _____. Why Pupils Fail in Reading (Chicago: University of Chicago Press, 1946).
134. Russell, David H. "Development of Thinking Processes," in Review of Educational Research, XXIII (April 1953), Ch. IV.
135. _____. "Interrelationships of the Language Arts and Personality," Elementary English, XXX (March 1953), pp. 167-80.
136. _____. "Research on Reading Disabilities and Personality Adjustment," in Improving Educational Research, Official Report (Washington, D.C.: American Educational Research Association, NEA 1948), pp. 10-13.
137. _____. "Reading Disabilities and Mental Health," Understanding the Child, XVI (January 1947), pp. 24-32.
138. Rutherford, W. J. "The Aetiology of Congenital Word-Blindness; with an Example," British Journal Child. Dis., VI (1909), pp. 484-88.
139. Saunders, Mary Jane. "The Short Auditory Span Disability," Childhood Education, VIII (October 1931), pp. 59-65.
140. Schmitt, C. "Developmental Alexia: Congenital Wordblindness, or the Inability to Learn to Read," Elementary School Journal, XVIII (1917-18), pp. 680-700, 757-69.
141. Schubert, Delwyn C. "Emotional and Personality Problems of Retarded Readers," Exceptional Children, XX (February 1954), pp. 226-28.
142. Selzer, Charles A. Lateral Dominance and Visual Function, Their Application to Difficulties in Reading, Writing, Spelling and Speech, Harvard Monographs in Education, No. 12 (Boston: Harvard University Press, 1933).
143. Sheldon, William D., and Carrillo, Lawrence. "Relation of Parents, Home, and Certain Developmental Characteristics to Children's Reading Ability," Elementary School Journal, LII (January 1952), pp. 262-70.
144. Sherman, Mandel. "Emotional Disturbances and Reading Disability," in Gray, W. S. (Editor), Recent Trends in Reading, Supplementary Educational Monographs, No. 49 (Chicago: University of Chicago Press, 1939), pp. 126-34.
145. _____. "Psychiatric Insights into Reading Problems," in Gray, W. S. (Editor), Clinical Studies in Reading I, Supplementary Monographs, No. 68 (Chicago: University of Chicago Press, June 1949).
146. Smith, Linda C. A Study of Laterality Characteristics of Retarded Readers and Reading Achievers, Ph.D. Dissertation, Temple University, 1949.
147. Spadino, E. J. Writing and Laterality Characteristics of Stuttering Children, Contributions to Education, No. 837 (New York: Bureau of Publications, Teachers College, Columbia University, 1941).
148. Stauffer, Russell G. Certain Psychological Manifestations of Retarded Readers, Ph.D. dissertation, Temple University, 1947.
149. _____. "Certain Psychological Manifestations of Retarded Readers," Journal of Educational Research, XLI (February 1948), pp. 436-52.
150. Stewart, Robert S. "Personality Maladjustment and Reading Achievement," American Journal of Orthopsychiatry, XX (April 1950), pp. 410-17.
151. Strang, Ruth. Problems in the Improvement of Reading in High School and College (Lancaster, Pa.: Science Press, 1938).
152. Sylvester, Emmy, and Kunst, Mary S. "Psychodynamic Aspects of the Reading Problem," American Journal of Orthopsychi-

atry, XIII (January 1943), pp. 69-76.
153. Teegarden, L. "Tests for the Tendency to Reversal in Reading," Journal of Educational Research, XXVII (1933), pp. 81-97.
154. Terman, Lewis M., and Merrill, Maud A. Measuring Intelligence (Boston: Houghton Mifflin Co., 1937).
155. Tinker, Miles A., and Goodenough, Florence L. "Mirror Reading as a Method of Analyzing Factors Involved in Word Perception," Journal of Educational Psychology, XXII (1931), pp. 493-502.
156. Trow, William Clark. Educational Psychology (Boston: Houghton Mifflin Co., 1931).
157. Tulchin, Simon H. "Emotional Factors in Reading Disabilities in School Children," Journal of Educational Psychology, XXVI (1935), pp. 443-454.
158. Van Riper, Charles. "Children Who Are Slow in Learning Speech (Speech Retardation)," in W. Johnson (Ed.), Speech Problems of Children (New York: Grune and Stratton, 1950), Ch., V.
159. _____. "The Quantitative Measure of Laterality," Journal of Experimental Psychology, XVIII (June 1935), pp. 372-82.
160. _____. Speech Correction, Principles and Methods (New York: Prentice - Hall, 1947).
161. Vorhaus, Pauline G. "Non-Reading as an Expression of Resistance," Rorschach Research Exchange, X (June 1946), pp. 60-69.
162. _____. "Rorschach Configurations Associated with Reading Disability," Journal of Projective Techniques, XVI (March 1952), pp. 3-41.
163. Warren, Howard C., and Carmichael, Leonard. Elements of Human Psychology (Boston: Houghton Mifflin Co., 1930).
164. Wechsler, David. The Measurement of Adult Intelligence (Baltimore: Williams and Wilkins Co., 1944).
165. Weisenburg, T. H. "A Study of Aphasia," Archives of Neurology and Psychiatry, XXXI (1934), pp. 1-33.
166. _____, and McBride, F. Aphasia (New York: The Commonwealth Fund, 1935).
167. Wells, F. L. Mental Tests in Clinical Practice (Yonkers-on-Hudson: World Book Co., 1927).
168. _____, and Ruesch, J. Mental Examiners' Handbook (New York: The Psychological Corporation, 1942).
169. Wepman, Joseph M. Recovery from Aphasia (New York: Ronald Press, 1951).
170. Wiksell, Wesley. "The Relationship Between Reading Difficulties and Psychological Adjustment," Journal of Educational Research, XLI (March 1948), pp. 557-58.
171. Wilking, S. Vincent. "Personality Maladjustment as a Causative Factor in Reading Disability," Elementary School Journal, XLII (December 1941), pp. 268-79.
172. Witty, Paul A. "Reading Success and Emotional Adjustment," Elementary English, XXVII (May 1950), pp. 281-96.
173. _____, and Kopel, David. "Causation and Diagnosis of Reading Disability," Journal of Psychology, II (1936), pp. 161-91.
174. _____. "Factors Associated with the Etiology of Reading Disability," Journal of Educational Research, XXIX (February 1936), pp. 448-59.
175. _____. "Sinistral and Mixed Manual-Ocular Behavior in Reading Disability," Journal of Educational Psychology, XXVII (February 1936), pp. 119-34.
176. Woody, Clifford, and Phillips, Albert J. "The Effects of Handedness on Reversals in Reading," Journal of Educational Research, XXVII (May 1934), pp. 651-62.
177. Yedinack, Jeanette G. "A Study of the Linguistic Functioning of Children with Articulation and Reading Disabilities," Journal of Genetic Psychology, LXXIV (1949), pp. 23-59.
178. Zirbes, Laura. "Some Character and Personality Problems of Remedial Cases in Reading," Childhood Education, V (December 1928), pp. 171-76.
179. Zolkos, Helena H. "What Research Says About Emotional Factors in Retardation in Reading," Elementary School Journal, LI (May 1951), pp. 512-18.

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RELATION BETWEEN PERSONAL VALUES AND SCHOLASTIC ACHIEVEMENT

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Introduction

ATTENTION IS directed here to a concept that patterns of values are effective in determining the quality of the relations that exist among persons. The relation between two persons is conceived to tend to be compatible and productive in proportion to the degree to which the value patterns of the two persons are similar. It is proposed that persons who are inclined to view life in the same manner or to exalt the same kinds of activities and conditions tend to be harmonious in their relations with each other. If such persons are placed in a situation in which a task is to be performed, consciously or unconsciously they very likely will agree on many elements related to the task and will have harmonious attitudes toward many of the issues that arise in the process of working together.

The concept suggests that an opposing effect is produced in the interrelations of persons whose patterns of values are substantially different. Conflicts in views related to elements of a task may tend to produce incompatibility in the relations of persons. This incompatibility may have a tendency to reduce the productivity expected in the interrelation.

Summarized here is an investigation of this concept in a public high school (2). This situation is considered suitable for an examination of the concept, for in a school a variety of persons associate with each other over a long period in many activities, and provision is made for appraising progress in the situation.

Perhaps the most important interrelation in a school is that which exists between teacher and pupil. The most accessible measure of the product of this interrelation is the teacher's rating of the pupil in terms of school marks. This study, therefore, was designed to explore effects of similarities and differences in value patterns on the interrelations of pupils and teachers as revealed through school marks.

This is primarily a statistical study in which inverted analysis, or the Q-technique, is used. Factor analysis is employed in examining one of the hypotheses. A sample of values is derived through the use of suggestions from studies of adolescence and previously developed concepts of values. Pupils sort the sample to describe their own value patterns; teachers sort it to describe their concept of a desirable pattern for pupils. With age, sex, and aptitude controlled, pupils who receive high marks from a teacher were expected to have value patterns more like that of the teacher ideal than were the pupils who receive low marks.

Techniques Employed

Inverted Analysis—Inverted analysis is a technique developed largely by Stephenson (12) and used by him and others in several studies. It is termed inverted because, as compared with the traditional r-technique, it reverses the roles of persons and traits. This technique provides for the treatment of a person with respect to a sample of traits instead of a trait with respect to a sample of persons. The correlation between two persons with respect to a distribution of traits is sometimes denoted by "Q" instead of "R".

Two basic assumptions of this technique are that the mean score for a sample of traits will not differ much from one person to another; and that the scores given to the large sample of traits tend to be distributed normally. Consequently, the means and the standard deviations are regarded as being the same, respectively, for all persons under consideration. This makes it possible to compute the correlation between two persons by product-moment procedures.

In this study a sample of ninety items was sorted into nine categories as determined by the coefficients in the expansion of the binomial $(a+b)^8$. The distribution derived in this manner was found to be

1 3 10 19 24 19 10 3 1 .

With the nine categories used as scores, this distribution has a mean of 5.00 and a variance of 2.2667. These numbers were used to complete the derivation of the formula for computing all correlation coefficients in the study. The "z" transformation was used in testing the significance of the difference between two r's. Chi

square was used for comparing groups.

The Spearman Two-Factor Pattern—Correlations computed by the inverted technique may be examined by factor analysis. The Spearman Two-Factor Pattern was found to be most appropriate for this investigation. This pattern presents a common factor and a unique factor. Through the use of reliability coefficients obtained in the study, it was possible to divide the unique factor into a specific factor and an unreliability factor. The pattern shows loadings, therefore, on three factors: common, specific, and unreliability.

The Sample of Traits

Definition of the Population—The traits used in this study are values. A value is defined as an activity or condition that is cherished. The population is limited to those activities and conditions that are significant to adolescents and are in agreement with previously developed concepts of values. From this population, ninety values were selected to form the sample.

It was necessary to establish some criteria for identifying activities and conditions that are significant to adolescents. Selected for this purpose were the results of two independent studies of adolescents, Developmental Tasks of Adolescence by Havighurst (5), and Youth Inventory by Remmers and Shimberg (9). The developmental tasks propose to include those things that an individual must learn if he is to be judged and to judge himself to be a reasonably happy and successful person. From the description of these tasks for middle, upper, and lower class young Americans many activities and conditions were suggested.

The SRA Youth Inventory was constructed under the auspices of the Purdue University Opinion Panel for Young People with the cooperation of more than one hundred high schools and over fifteen thousand teen-agers throughout the country. The inventory is a check list of two hundred ninety-eight statements and questions designed to identify problems about which youth are concerned. These statements and questions were reviewed for suggestions of activities and conditions that are cherished by youth. A few examples are cited here to illustrate the identification of items from the inventory. The statement, "I wish I were more popular," suggests popularity as a condition that is cherished. "I wish I could gain the confidence of my parents" suggests wholesome family relations as a cherished condition. "Does it really pay to be honest?" "I feel that I am not living up to my religion," "Am I likely to succeed in the work I do when I finish school?" further illustrate sources for suggestions of activities and conditions that youths hold dear.

Classification of Items for Sample—Many activities and conditions to be considered for use in the study were suggested by the foregoing procedure. The next step was to examine these statements for items that might comply with previously developed concepts of values and to select a sample representative of the several classes of values. The interpretation of the Spranger "Types of Men" as revised in 1951 by Allport, Vernon, and Lindzey in Study of Values (1), "Students' General Goals for Life" as presented by Dunkel (4), and values used in a test constructed by Woodruff (14) were employed for this purpose.

Although there is much similarity among these three classifications of values, they differ somewhat in certain elements. In selecting a classification for this study, the investigator attempted to include the essential elements of all three of these previous studies. The sample derived includes ninety items equally divided among the following classes of values: economic, religious, political, aesthetic, altruistic, social, hedonistic, physical, ethical, and theoretical. "Altruistic" replaces "social" as defined in Study of Values, and "social" is made to apply to relations with people as suggested in Dunkel's list of goals.

Focus and Scope of the Investigation

Statement of Hypotheses—This study was designed to explore the effect of values on pupils and teachers in the determination of school marks. The following three hypotheses were examined:

1. Among pupils of similar aptitude, age, and sex, the value patterns of those who receive high marks in a particular subject tend to have higher correlation with pupil value patterns considered ideal by the teacher who determines the marks than do the patterns of pupils who receive low marks in the subject.

2. If aptitude, age, and sex are controlled, the value patterns of pupils with high scholarship averages in their several subjects will tend to have higher correlation with a composite value pattern determined by several teachers in the school than will patterns of pupils with low averages.

3. In a Spearman Two-Factor pattern composed of a sample of teachers, a given number of high achieving pupils, and the same number of low achieving pupils in a particular high school, the loadings on the common factor for teachers and high achieving pupils will tend to exceed loadings on this factor for low achieving pupils.

Definition of Terms—A value is defined as an activity or condition that is cherished. A pattern of values is the distribution of a sample of activities and conditions with respect to the degree to which they are cherished by a person. The position of a particular value in an individual's pattern of values is determined by his ranking of the activity or condition in the distribution of the sample.

Each value in the hierarchy is viewed as a vector whose magnitude is a function of time and the momentary internal and external pressures on the individual. The many pressures and the series of past and anticipated experiences that account for the existence of particular values necessarily are related to the rationale of this study. The primary focus of the investigation, however, is on the pattern already accomplished within the person and its effect on certain inter-personal relations.

A composite value pattern is the distribution of the sample of values determined by averages of several persons' raw scores for each value.

The pupil pattern considered ideal by the teacher is that which is determined by the teacher's sorting of the sample to describe the kind of hierarchy of values that he would like to see pupils have for themselves.

Achievement is defined as progress of students as rated by teachers in terms of school marks. "A" and "B" denote high achievement, "D" and "F", low achievement. Mass subjects like physical education are excluded from the investigation.

Aptitude is determined by performance of pupils on the Revised Otis Classification Test and on the numerical, verbal reasoning, and abstract reasoning parts of the Differential Aptitude Tests developed by Bennett, Seashore, and Wesman (3). All test results are expressed in percentile ranks. The aptitudes of two pupils are considered similar if the percentile ranks differ by ten or less on one or more of these tests. In cases where one member of a pair excels on one test and the other member excels on a different test, the difference in percentile ranks was permitted to exceed ten.

The ages of two pupils are considered similar if they differ by less than one year. If other matching data were exceptionally good, this age difference was allowed to vary somewhat. The variation from this requirement in any case, however, was not permitted to exceed seven months.

Assumptions and Delimitations—Several assumptions are made in this investigation. Four of them seem sufficiently important to receive attention at this point.

It is assumed that values tend to be distributed normally within the individual. Actually some skewness was indicated from observation of sorters at work. With the inverted technique, sorters were forced to smooth this skewness into a normal distribution. This assumption, however, does not seem to be sufficiently untenable to affect seriously the merit of findings in this study.

It is assumed also that there is a constant mean of the distribution of the sample for all persons in the study. In the derivation of the formula for computing correlations, the difference between means is taken to be zero. It is conceivable that, due to general variation in degrees of intensity of values, the whole distribution of the sample may shift up or down from one person to another. These variations may occur in spite of the normality of the distribution. No provision is made in the study to estimate the extent of such possible shifts. One perhaps can conceive of the existence of a population of values that has a stable mean for all persons in a particular situation. The definition, identification, and appropriate sampling of such a population, however, are beyond the scope of this investigation. Nevertheless, an effort was made to obtain a sample of values that represents the various levels of intensity likely to exist among persons in the situation in which the study was made.

The third important assumption is that it is possible to identify a population of values common in varying degrees to all persons in a particular situation. The use of carefully prepared studies of adolescence as sources for items was intended to prevent any significant weakness that might exist in the study as a result of this assumption. A related assumption is that the values can be expressed so that they will have the same meaning to different persons. An attempt was made to minimize the effect of this problem of semantics by expressing activities and conditions in terms commonly encountered in youth parlance. Also, in administering the sorts, the investigator sought to present uniform interpretation when questions were asked occasionally about the meaning of an item.

A fourth assumption is that persons will express real feelings about activities and conditions presented to them. This assumption seems reasonable, for the sample purposely was constructed to include only items that are regarded as positive by most people. Instead of having a sample of positive and negative items with zero as the mean, the sample tends to begin at zero and to extend only in the positive direction for most people. It appears that a person is not likely to disguise his feelings very much when dealing with items that may be regarded easily as positive. A check on this assumption is provided to some extent by the procedure for estimating the reliability of sorters. It is recog-

nized, however, that a person probably could disguise his real feelings consistently.

A problem related to the foregoing assumption is that a person may not be aware of his real feelings. Although the existence of such unconscious values is recognized, this study is designed to consider only those that exist at the level of consciousness or can be brought to awareness by stimuli in the items presented.

It is recognized that value patterns do not account for all the variance in school marks not accounted for by aptitude. It is considered that several other factors may exist with varying degrees of effect. The hypotheses are intended to express the belief merely that some of this variance can be attributed to value patterns.

Collection of Data

The Sample of Sorters—The sorters used in this study were pupils and teachers in one of the eight public high schools of a city in the northwest of Indiana. The school was composed of pupils in twelve grades with approximately twenty-one hundred in the first eight grades and twelve hundred in high school.

Six teachers were selected from the four major subjects—English, mathematics, science, and social studies. All the teachers participating had served in this high school at least six years. The teachers are equally divided with respect to sex.

In order to obtain data for the examination of the first hypothesis, pupils were selected from a particular teacher's group in pairs matched for age, aptitude, and sex. The most recent officially recorded semester marks were used to identify low and high achievers. Pupils selected as sorters for the second and third hypotheses were not restricted to a particular teacher or subject. Averages of marks for the preceding semester were used in forming pairs in these groups. Forty-eight pupils were used for the first hypothesis, twenty-four for the second, and sixteen pupils with four teachers were used to form the twenty-by-twenty matrix for the factor analysis.

Administration of Sorts—Each of the ninety values was typed on a small card. The cards were randomized and the order of the random sample was indicated by code. All sorters received the cards arranged in the same order. In addition to providing a uniform order for the appearance of cards in the sorting process, the arranging of cards after each sorting assured the investigator that all cards were present for the next sorter.

The investigator administered the sorts in a private room to not more than three persons at a time. Each person worked independently and at his own speed. Sorting time ranged from approximately thirty to seventy-five minutes. Uniform interpretation was given for occasional questions concerning items.

Each person was given a cardboard on which were indicated a space to the right for placing the thirty-three items cherished most, a space to the left for the thirty-three items cherished least, and a space in the center for the twenty-four moderately cherished items. Also, each sorter was supplied with a device containing nine compartments with labels indicating the number and the preference order of items to be placed in each compartment. Specific instructions for pupil sorters follow:

You have been given a set of cards on which activities and conditions are listed. All of these activities and conditions are cherished in some degree by most people. People differ, however, in the amount of personal significance they place on particular activities and conditions. The correct response is that which expresses the way you really feel about an item. The results will be treated confidentially and will in no way affect your standing in school.

You are asked to indicate how relatively dear each activity or condition is to you by sorting this set of cards. Look at the large cardboard and the device with the nine compartments in it. Note the labels on them. These will help you follow the directions. This is what you do:

1. Sort the cards into three piles, placing to the right those items that you cherish most, to the left those you cherish least, and in the center the moderate group.
2. Adjust these piles so that there are thirty-three items to the right, thirty-three to the left, and twenty-four in the center.
3. Place the pile of twenty-four cards in the center compartment of the device on your desk.
4. Sort the thirty-three items to the right. Place the appropriate number of cards (nineteen, ten, three, and one) in the compartments as indicated, with the one most cherished item in the last compartment to the right.
5. Repeat the fourth step in the opposite direction for the thirty-three cards in the left pile. The least cherished item should be in the last compartment to the left.
6. Look through the cards in each compartment and make any additional adjustment that may be desired by shifting cards up or down from one compartment to another, but always keep the correct number of cards in each compartment.
7. Count the cards in each compartment to make certain that the numbers correspond with those indicated on the labels in the compartments.

This completes the sorting. The investigator memorized these directions and presented them to sorters orally. The labels on the devices made it practically impossible for anyone to misunderstand the procedure.

Teachers were given related instructions except that they were asked to sort the cards to describe the way they should like to have their pupils feel about activities and conditions. The items in their sets of cards were expressed in the third person.

When the sorts were completed, the investigator entered the rating for each item, the name of the sorter, and the date on a tabulating sheet. The ratings ranged from one for the least cherished item, to nine for the item cherished most. Correlations were computed from these sheets.

Procedure for Estimating Reliability—Sortings were repeated after approximately two and one-half weeks to obtain an estimate of stability. This procedure was planned to identify any pupils who might sort the cards thoughtlessly. It was considered also as a procedure for probably detecting persons who might seek to disguise real feelings. The effectiveness of the procedure for this purpose is uncertain, for it may be possible for persons in some cases, consciously or unconsciously, to disguise real feelings consistently. It was recognized that, in thinking over the sorting experience between sorts, persons could change their feelings about some of the items. Consequently, the reliability coefficients were expected to be somewhat lower than those obtained with devices having fixed correct responses.

Examination of Data for Evidence Concerning Hypotheses

Pupils Related to Individual Teachers—The data collected by the foregoing procedure were used to examine the hypotheses of this investigation. The first hypothesis is that among pupils of similar aptitude, age, and sex, the value patterns of those who receive high marks in a particular subject tend to have higher correlation with value patterns considered ideal by the teacher who determines the marks than do the patterns of pupils who receive low marks in the subject.

The investigator examined this hypothesis by correlating value patterns of low and high achievers with the pattern considered by the teacher to be ideal for pupils. The matching data include sex, age in terms of month and year of birth, percentile ranks on the Otis Classification Test and for verbal reasoning, numerical ability, and abstract reasoning in the Differential Aptitude Tests; and the school mark for the subject which the pupil has with the particular teacher. Additional data collected during the investigation are the reliability coefficients, correlation of pupil and teacher sorts, the "z" transformation for the correlation coefficients, and the differences between the transformed coefficients for the low and high achieving pupils in each pair. The significance of each difference is assessed and "yes" or "no" is used to indicate whether or not the difference is significant at the 5 percent level.

These data are presented in Table I. The code and abbreviations in the table are to be interpreted in the following manner:

i	= the pupil
A, B...	= the respective teachers
1, 2...	= number for pair of pupils in teacher's group
L	= low achieving pupil
H	= high achieving pupil
age	= month and year of birth
PR	= percentile rank
Otis	= Otis Classification Test
DAT	= Differential Aptitude
verb.	= verbal reasoning
num.	= numerical ability
abs.	= abstract reasoning
mark	= pupil's mark from the particular teacher
R_{ii}	= coefficient of reliability for pupil
R_{iT}	= teacher-pupil correlation
z_{iT}	= "z" transformation for R_{iT}
D	= difference between z_{iT}'s for high and low achievers
sig.	= significance of difference at 5 percent level

"A" is a female teacher of English and part-time counselor; "B" is a female teacher of mathematics; "C" is a female English teacher; "D" is a male social studies teacher; "E" is a male biology teacher, and "F" is a male social studies teacher. Teacher reliability coefficients range from seventy-two to eighty-five, and the inter-correlation coefficients for the teachers' value patterns range from fifty-five to seventy-one.

Evidence from these data with respect to the hypothesis is summarized in Table II. The results are presented in three vertical and two horizontal categories. There is a summary for all differences and a separate one for the significant differences. These summaries are made for all pairs of pupils and then the results for pairs in which each reliability coefficient is .45 or more and those in which each coefficient is .60 or more are presented separately.

Of the twenty-four pairs of low and high achievers, there were two for which the hypothesis was reversed and twenty-two, or 92 percent, for which the hypothesis was confirmed. Of the ten significant differences, one reversed and

TABLE I

PUPIL RELIABILITIES, TEACHER-PUPIL CORRELATIONS, AND DIFFERENCES FOR HIGH AND LOW ACHIEVERS

i	Sex	Age	Otis PR	DAT PR verb.	DAT PR no.	DAT PR abs.	mark	R_{ii}	R_{iT}	z_{iT}	D	sig.
A1L	M	4/37	64	75	55	60	D	.63	.04	.040		
A1H	M	6/37	64	65	37	65	A	.78	.68	.829	.789	yes
B1L	M	11/38	47	60	45	20	D	.57	.13	.131		
B1H	M	9/38	50	40	35	70	B	.66	.56	.633	.502	yes
B2L	M	12/36	3	10	15	85	D	.47	.36	.377		
B2H	M	10/36	5	20	35	25	B	.68	.62	.725	.348	yes
B3L	M	6/38	50	35	75	3	D	.62	.46	.497		
B3H	M	1/38	47	65	65	75	B	.77	.62	.725	.228	no
B4L	F	10/37	30	30	30	30	D	.68	.49	.536		
B4H	F	6/37	32	5	15	70	B	.80	.65	.775	.239	no
B5L	F	12/36	12	50	25	50	D	.61	.47	.510		
B5H	F	6/36	8	10	30	12	B	.64	.59	.678	.168	no
B6L	F	10/37	64	70	70	35	D	.68	.41	.436		
B6H	F	10/38	68	55	75	55	B	.42	.37	.388	-.048	no
B7L	F	5/38	45	15	25	50	D	.78	.61	.709		
B7H	F	3/38	55	55	75	65	B	.50	.41	.436	-.273	yes
C1L	M	6/36	36	57	18	34	D	.40	.36	.377		
C1H	M	1/37	30	30	73	37	A	.45	.49	.536	.159	no
C2L	F	7/37	28	9	3	54	D	.73	.47	.510		
C2H	F	7/37	53	57	50	57	B	.79	.63	.741	.231	no
C3L	F	2/37	78	46	88	84	D	.75	.30	.310		
C3H	F	8/37	47	60	46	47	A	.85	.42	.448	.138	no
C4L	F	11/37	20	4	1	1	F	.29	.07	.070		
C4H	F	10/37	19	50	30	27	B	.69	.53	.590	.520	yes
D1L	M	7/35	11	2	4	3	D	.62	.17	.172		
D1H	M	5/36	1	40	40	24	B	.56	.35	.365	.193	no
D2L	M	7/35	62	10	10	30	D	.52	.15	.151		
D2H	M	11/35	60	40	20	30	B	.67	.43	.460	.309	yes

TABLE I (Continued)

i	Sex	Age	Otis PR	DAT PR verb.	DAT PR no.	DAT PR abs.	mark	R_{ii}	R_{iT}	z_{iT}	D	sig.
D3L	M	1/34	26	14	4	15	D	.63	.20	.203		
D3H	M	8/35	19	23	13	25	B	.77	.39	.412	.209	no
D4L	M	2/36	36	..	30	80	D	.68	.27	.277		
D4H	M	8/36	30	85	15	34	B	.79	.62	.725	.448	yes
D5L	M	11/35	45	17	18	18	D	.75	.30	.310		
D5H	M	9/36	36	20	18	60	B	.60	.32	.332	.022	no
E1L	F	5/37	55	50	73	29	F	.45	.06	.060		
E1H	F	7/37	53	57	50	57	A	.79	.56	.633	.573	yes
E2L	F	7/37	20	25	8	8	F	.48	.11	.110		
E2H	F	1/38	19	10	25	29	B	.85	.57	.648	.538	yes
E3L	F	6/37	47	17	5	1	F	.55	.38	.400		
E3H	F	11/37	45	25	20	15	A	.62	.51	.563	.163	no
E4L	M	6/37	30	14	9	37	D	.66	.25	.255		
E4H	M	1/37	30	30	73	37	B	.45	.47	.510	.255	yes
E5L	F	4/37	47	25	70	83	D	.78	.13	.131		
E5H	F	8/37	47	60	46	47	B	.85	.29	.299	.168	no
F1L	M	7/35	57	50	7	54	D	.74	.09	.090		
F1H	M	3/36	40	40	75	65	B	.66	.25	.255	.165	no
F2L	F	10/35	43	46	25	50	D	.64	.35	.365		
F2H	F	10/35	43	36	46	18	A	.62	.46	.497	.132	no

TABLE II

SUMMARY OF DIFFERENCES IN TEACHER-PUPIL CORRELATIONS FOR LOW AND HIGH ACHIEVERS IN THREE LEVELS OF PUPIL RELIABILITIES

Effect on Hypothesis	All Pairs		Reliability .45 or More		Reliability .60 or More	
	Number	Percent	Number	Percent	Number	Percent
All Differences						
Reversed	2	8.3	1	4.8	0	0
Confirmed	22	91.7	20	95.2	12	100
Significant Differences						
Reversed	1	10	1	11	0	0
Confirmed	9	90	8	89	2	100

TABLE III

CHI SQUARE DISTRIBUTION OF TEACHER-PUPIL CORRELATIONS FOR HIGH AND LOW ACHIEVERS IN PARTICULAR SUBJECTS

Pupils	Pupil-Teacher Correlations Above Median	Pupil-Teacher Correlations Below Median
High Achievers	18	6
Low Achievers	6	18

nine confirmed the hypothesis.

Among the twenty-one pairs with reliability coefficients of .45 or more, the hypothesis was reversed in one difference and confirmed in twenty, or 95 percent, of the differences. For the nine significant differences among the pairs with coefficients of .45 or more, there were eight confirmations and one reversal of the hypothesis.

All the twelve pairs with reliability coefficients of .60 or more had differences that confirmed the hypothesis. Two of these differences are significant.

In order to extract a more general statistical inference from the data, chi square was applied in a comparison of high and low achievers. All the sorters are treated as a group in this analysis. Because the pairs are matched, however, there are as many of the different kinds of low achievers with respect to aptitude, age, and sex as there are of the high achievers.

The chi square analysis is made with the teacher-pupil correlations for low and high achievers. The median is used as the point of division in forming the dichotomy. The chi-square distribution for low and high achievers is shown in Table III. The expected frequency for each cell in the distribution is twelve. In view of the fact that no expected frequency is less than ten and that correction for continuity is made, the application of chi square to these data is considered appropriate.

The distribution yields a chi square of 10.08 which has been corrected for continuity. The value of chi square at the 1 percent level of significance and for one degree of freedom is 6.635. The null hypothesis of no difference between the low achievers and the high achievers with respect to correlation of pupil and teacher value patterns, therefore, is rejected and the first hypothesis of the investigation is confirmed by this analysis.

Pupils Related to a Group of Teachers—In the first hypothesis pupils were related to particular teachers. It was supposed that from the teacher-to-pupil and pupil-to-teacher relations an effect on school marks emerges. The degree of similarity of the value pattern of the pupil and the teacher's ideal pattern for pupils was believed to be a significant factor in determining the character of this effect.

The second hypothesis relates pupils to a group of teachers. The teachers are regarded as a sample of the high school faculty, with the exception of teachers of vocational or other special subjects. This sampling process for teachers increases the probability of error in estimating the effect produced through pupil-teacher relations. However, the fact that the intercorrelations of value patterns described by teachers tend to be high and positive, offsets some of this probable error.

The second hypothesis is that if aptitude, age, and sex are controlled, the value patterns of pupils with high scholarship averages in their several subjects will tend to have higher correlation with a composite value pattern determined by several teachers in the school than will patterns of pupils with low averages. Twenty-four pupils and five teachers were used in examining this hypothesis. A teacher composite value pattern was determined by computing the average of ratings by five teachers for each item in the sample.

The findings for this hypothesis are in agreement with those of the first hypothesis. Of the twelve differences obtained, the hypothesis was reversed in one and confirmed in eleven or 91.7 percent of them. Differences for all of the eleven pairs with reliability coefficients of .45 or more confirmed the hypothesis.

A chi square analysis of these data also confirmed the hypothesis. The difference between high and low achievers in this case, however, was found to be significant only at the 5 percent level.

Factor Analysis of Pupils and Teachers—So far in this analysis, pupils have been related to individual teachers and to a group of teachers. In the examination of the third hypothesis, pupils will be related to teachers and to other pupils simultaneously. The third hypothesis is that in a Spearman Two-Factor pattern composed of a sample of teachers, a given number of high achieving pupils, and the same number of low achieving pupils in a particular school, the loadings on the common factor for teachers and high achieving pupils will tend to exceed loadings on this factor for low achieving pupils.

Intercorrelations of teachers with teachers and teachers with high achievers were expected to be higher than the intercorrelations of teachers with low achievers. The hypothesis requires that there be as many high achievers as there are low achievers. Therefore, the combination of teachers and high achievers would give this group a majority for determining the communality in the pattern for the whole group of sorters. However, unexpectedly high intercorrelations among pupils could offset the outcome predicted in the hypothesis.

Four teachers, four low achieving boys, four low achieving girls, four high achieving boys, and four high achieving girls were used to examine this hypothesis. Data concerning pupils in this analysis are presented in Table IV. In the column under "person", B is for boy, G is for girl, H is for high achiever, and L is for low achiever. In the other columns, age in terms of month and year of birth, percentile rank on the Otis Classification Test, percentile ranks in verbal reasoning, numerical ability, and abstract reasoning of the Differential Aptitude Tests, and achieve-

TABLE IV

INFORMATION CONCERNING PUPILS USED IN FACTOR ANALYSIS

Person	Age	Otis PR	DAT PR			Mark Average
			verb.	no.	abs.	
B1H	6/36	19	8	40	87	3.20
B2H	3/37	68	88	70	70	3.20
B3H	6/37	64	65	37	65	3.00
B4H	10/36	5	20	35	25	2.50
G1H	3/37	47	46	46	27	3.00
G2H	1/38	19	10	25	29	2.75
G3H	6/37	32	5	15	70	2.61
G4H	10/35	43	36	46	18	4.00
B1L	4/37	64	75	55	60	1.50
B2L	1/34	26	14	4	15	1.00
B3L	7/35	62	10	10	30	1.00
B4L	6/37	30	14	9	37	.75
G1L	4/37	47	25	70	83	1.25
G2L	2/37	78	46	88	84	.75
G3L	7/37	20	25	8	8	1.00
G4L	5/37	55	50	73	29	1.00

ment averages are shown. Teachers A, B, D, and E of Table I are used and are identified by T1, T2, T3, and T4, respectively. A larger group of teachers and pupils were desired, but was not practical, for this analysis.

The intercorrelations of these twenty persons were computed and arranged in a matrix. In obtaining the solution for this matrix, the negative correlations were regarded as zero. This could not alter the solution substantially, for the largest negative correlation coefficient, -.16, does not differ significantly from zero. The solution was obtained by a procedure outlined by Holzinger (6). The Spearman Two-Factor Pattern for these twenty persons is presented in Table V.

The pattern confirms the hypothesis completely. The relations of teachers to teachers and teachers to high and low achieving pupils were forecast from earlier analyses, but the relation of pupils to pupils had not been explored previously. Therefore, the effect of this latter relation on common factor loadings was difficult to predict. Observation of the intercorrelations matrix revealed a rather stable positive relation among high achieving pupils but very little consistency in the correlations of low achievers either among themselves or with high achieving pupils. This is demonstrated again in the comparatively high degree of specificity for low achievers in the factor pattern.

It may be noted in Table V that the coefficient of the common factor for each teacher and high achiever is larger than the coefficient of either the specific or unreliability factor, and that the range of these common factor loadings, .64 to .79, is small for this group of sorters. This suggests considerable homogeneity of persons in this group with respect to the sample of values.

Although common factor loadings for low achievers are less than those for teachers and high achievers, it may be observed that these loadings are fairly substantial for several persons in this group. This indicates the existence of certain items in the sample that tend to be cherished to the same degree by all persons in the analysis. Nevertheless, the rather large coefficients for the specific factor suggest that, while sharing certain values characteristic of the group, each person retains his own individuality. Perhaps this specificity could be reduced if suitable group factors, or patterns of values characteristic of sub-groups, could be identified. However, except for the grouping based on achievement as previously cited, no clusters appeared in the intercorrelation matrix.

Supplementary Analysis with Standardized Achievement Test Data—The study was designed to explore only the total effect of values on the interrelations of pupils and teachers as revealed through school marks. It appeared, however, that the findings could be interpreted more adequately if one had some insight concerning whether values produce their effect primarily by influencing the teacher to express bias in marking pupils or by influencing pupils to retard or accelerate their actual achievement. As a supplementary exploration this question was examined by relating values directly and indirectly to the achievement of twenty pupils as measured by standardized tests.

It was inferred from a chi square analysis of these data that there are significant positive relations between school marks and performance on achievement tests and between school marks and value patterns. These findings yield the deduction that there is a positive relation—though not necessarily significant—between values and performance on standardized achievement tests.

Then, with aptitude controlled, values were related directly to performance on standardized achievement tests. From a chi square distribution it was inferred that there is a positive relation between values and performance on standardized achievement tests, but that the relation is not statistically significant. This finding tends to be in agreement with that of an investigation by Rothney (11). In the present study, however, the existence of a positive relation between values and performance on standardized achievement tests has been inferred indirectly and indicated directly by chi square distributions. It may be that the sorting technique employed in this study is a more appropriate device for this kind of investigation than the "Study of Values" used by Rothney.

Perhaps the most important characteristic of the present study in comparison with that of Rothney is the provision it makes for pupil values and achievement to be appraised in relation to teacher standards. This was accomplished by correlating pupil patterns of values with patterns that teachers consider ideal for pupils and by using school marks as the measure of achievement. The inference of a positive significant relation between values and school marks and a positive though not significant relation between values and performance on standardized tests suggests the conclusion that values operate in the interrelation of pupils and teacher to produce an effect on the teacher in determining marks and on the pupils in the learning process. It seems to be the combined effect of teacher bias and pupil retardation or acceleration in learning that accounts for the significant positive relation between values and school marks.

Item Analysis—Items in the sorts were analyzed to provide insight into the content of the differences and similarities among value patterns of teachers, high achieving pupils, and low achieving pupils. As compared with high achieving pupils and teachers it was found that the low achieving pupils tend to exalt hedonistic, econom-

TABLE V

SPEARMAN TWO-FACTOR PATTERN FOR FOUR TEACHERS EIGHT HIGH ACHIEVING PUPILS, AND EIGHT LOW ACHIEVING PUPILS

Person	Coefficients of Factors		
	Common	Specific	Unreliability
T1	.71	.59	.40
T2	.79	.47	.39
T3	.71	.47	.53
T4	.70	.56	.45
B1H	.72	.60	.35
B2H	.64	.57	.51
B3H	.73	.49	.47
B4H	.70	.44	.57
G1H	.67	.43	.61
G2H	.71	.59	.39
G3H	.68	.58	.45
G4H	.74	.26	.62
B1L	.41	.68	.61
B2L	.26	.75	.61
B3L	.35	.63	.69
B4L	.50	.64	.58
G1L	.36	.81	.47
G2L	.51	.70	.50
G3L	.23	.65	.72
G4L	.17	.65	.74

ic, and political values and to minimize ethical, altruistic, and in a smaller degree religious values. It is recognized, however, that the content of the differences may vary in other schools without altering the effects of the differences as stated in the hypotheses of this investigation.

Conclusions and Applications

Statement of Findings—The findings of this investigation through several statistical analyses indicate strongly that value patterns operate in the interaction of pupils and teachers. It is reasonable to conclude within the limits of these data and with recognition of assumptions made in the investigation that the degree of similarity of teacher ideal and pupil patterns of values tends to be related directly to the level of pupil achievement as rated by teachers in terms of school marks.

Suggested Application of Findings to Education—The findings in this study suggest several questions concerning education: (1) What can be done to reduce the effect of teacher bias in marking pupils? (2) How can the teacher facilitate learning for the pupil whose value pattern tends to be different from the teacher's ideal? (3) Can educators determine the relative degrees to which pupils should cherish certain activities and conditions? (4) How can teachers aid the development of optimum value patterns for pupils? These questions are explored briefly here.

The pupil whose value pattern happens to be different from that preferred by the teacher seems to have two disadvantages. It appears that his actual learning may be retarded through negative effects in his daily interaction with the teacher and his marks may be reduced further through teacher bias. If this pupil perceives that he is a victim of bias in grading, his discouragement may be a further factor that tends to retard achievement. The teacher and the pupil may be unconscious of the factors that operate in their interrelations and of the effect that is produced.

Perhaps educators could minimize the problem of bias in grading by emphasizing a more comprehensive application of objective devices in appraising and recording pupil progress. Apparently objective tests have been used rather extensively to estimate pupil achievement, but it seems that these tests have been expected to sample only certain aspects of the school subjects. Other aspects apparently are appraised often by subjective judgments. The development of objective devices that sample all important aspects of the behavior and content implied by the objectives of a school subject may help to eliminate teacher bias in appraising pupil achievement. Devices of this kind are described by Smith and Tyler (13).

An implication of the findings that is perhaps more fundamental than the elimination of bias in grading is the need to facilitate the actual achievement of pupils whose patterns of values happen to differ from those considered ideal by the teacher. It appears that values may affect learning conditions by influencing the reaction of the pupil to the teacher and the teacher to the pupil in their daily personal interrelations, and that they also may affect the motivation and probably the perception of pupils for learning experiences planned by the teacher.

In an effort to facilitate the learning of the pupil whose values tend to be different it seems that improving interpersonal relations with this pupil is a crucial task that must be assumed by the teacher. It appears that superficial efforts to accomplish this may be quite ineffective or perhaps damaging. It is proposed that the teacher needs to adopt a profound belief that there resides within each pupil who is in adequate emotional and mental condition to attend school the constructive forces necessary for progress toward the realization of his best self. It should be recognized also, perhaps, that the valid ideal for the pupil may differ considerably from what the teacher regards as ideal for him. This kind of faith in the potentiality of the pupil seems essential for the creation of an acceptable feeling tone in the interrelation of pupil and teacher. The teacher seems to be in an advantageous position to initiate the kind of acceptance which may elicit gradually a similar response from the pupil. It may be that under this condition the constructive forces within the personality of the pupil will tend to be set free to begin progress toward the realization of potentialities. Without this kind of basic rapport, the interaction of words and deeds between teacher and pupil may not be very productive.

In an effort to help teachers acquire this kind of faith in pupils, perhaps teacher training institutions should emphasize the need for teachers to understand child development, to realize that pupils are to a large extent products of their experiences, and to recognize that in most cases pupils might not have been responsible for the kind of experiences they have had. They probably should be reminded also that democracy is based on the faith that the individual in freedom is capable of worthy achievement.

After the teacher has acquired the faith in pupils which seems to be essential for initiating improved relations, his attention might be directed toward selecting learning experiences that will be representative of types of culture suggested by various patterns of values. This suggests that teacher training programs probably should be designed to develop understanding of the characteristics of life in the variety of cultures or social classes. This basic training in sociology perhaps could be supplemented by in-service

programs in which characteristics of cultures represented in a particular school district or city are investigated by teachers. This training may help teachers select an appropriate variety of learning experiences for all pupils in the school.

Having explored what might be done through the teacher to improve learning conditions for the pupil, one may wish to consider what might be done through the pupil to improve learning. If the pupil's values are a factor in retarding his achievement, should the teacher seek to change the pupil's values so that he might become more receptive to the learning experiences? In view of the foregoing discussion this question presents some rather serious problems. If the pupil's pattern of values could be changed, who would have the knowledge or the moral right to determine what changes should be made? Is it necessarily desirable for pupils to cherish the kinds of activities and conditions that teachers consider ideal for pupils? It seems very likely that the teacher would have considerable difficulty in attempting to determine what a pupil's pattern of values should be.

If teachers could agree upon optimum value patterns for pupils, there would still remain the problem of changing present patterns in the direction of those desired. If pupils whose value patterns are different from those preferred by the teacher have a handicap in general learning in a school subject, one may expect this handicap to be even greater in learning new values through methods similar to those used with the other aspects of the subject.

The interpretation and proposals presented here are not intended to imply that the teacher should express approval of the variety of value patterns that exist in pupils or assume an attitude of indifference toward them. It may be that assistance in developing realistic patterns of values is one of the most needed contributions that education can make to youth, especially in communities in which homes and other agencies tend to be inadequate in the performance of this task. The proposals here are intended to emphasize a method that may facilitate achievement in subjects and the development of realistic values.

If through the teacher's faith in the potentiality of the pupil an interrelation characterized by mutual acceptance is established, the constructive forces within the pupil may begin to operate in the direction of optimum goals. Under this condition the teacher may provide experiences which may be effective in facilitating the pupil's first step toward the development of a new pattern of values. Repetition of satisfying experiences in an emotionally warm climate may contribute to a more definite canalization of values in the manner described by Murphy (8).

It appears that there are two important characteristics of the learning experiences that the teacher should provide for pupils after appropriate rapport has been established. In the first place, it seems that the experiences should contain content that will bring to the attention of pupils those moral and ethical standards that have been tested through long experience and are recognized commonly in modern society. The school may be in a position to provide the only opportunities for many pupils to be exposed to these standards.

The second characteristic that seems important is that the content should be related to elements of previous experiences of the variety of pupils in a particular group. Content that is unrelated to their previous experiences may have little motivating power for pupils and may be difficult for them to apply in reorganizing new patterns of values. The content may tend to increase in effectiveness if it facilitates the integration of new views into previous experiences.

Changes in dominant goals, however, are not likely to be accomplished without some serious difficulties which may sometimes be insurmountable. In the situation that has been described the teacher and the new learning experiences which the pupil has begun to accept may tend to constitute a new pressure within the pupil's personality. This kind of pressure may develop in the pupil a new need as defined by Murray (7). But the pupil may still have the pressures which helped to form and maintain the old value pattern—perhaps the family, the peer group, or conditions and activities that have been cherished. These may produce a need, or a disequilibrium, in the opposing direction. Consequently, internal consistency may be interrupted and a conflict developed within the pupil. If the operation of the constructive forces set free in the pupil by the new experience of real acceptance provided by the teacher—and preferably by others also—can be sustained, and if suitable learning experiences can be provided under the conditions described and reinforced long enough for the pupil to overcome the conflicts that may develop, perhaps real lasting progress can be made toward an appropriate realistic pattern of values.

It seems, therefore, that teachers might help pupils develop appropriate values not by trying to teach them in the usual manner, but by adopting the kind of faith in pupils that makes them feel the warmth of acceptance, by exposing them to a variety of learning experiences that emphasize ideals of the common heritage, by relating the learning experiences to elements of the pupils' previous experiences, and by leaving the pupils free under these conditions to select what they wish to employ in reorganizing their own patterns of values. The teacher may not be able to impose his ideal values on pupils, but he may be able to create the kind of learning condition

and provide the kind of learning experiences that will induce pupils to begin reorganizing their own patterns in a manner most suitable for their potentialities. If the condition and the experiences are sustained and reinforced sufficiently in the school, pupils may be able to overcome counteracting pressures that they may encounter. It may be that if the school can help them begin canalization of values in this manner, pupils may consciously or unconsciously allow the constructive forces within their personalities to continue to operate beyond school days.

In addition to the application of the content of the findings it may be possible to apply in education some of the techniques used in this investigation. For example, counselors may find the technique useful in studying clients whose value patterns appear to be distorted. Through an examination of items placed at upper and lower extremes in sorts, the counselor may gain some insight into the nature of the distortion. At intervals during therapy the counselor may administer sorts to the client to examine changes in his pattern of values. Rogers (10) discloses that his experience with recordings of therapeutic interviews and transcribed material suggests that it is very evident that therapy somehow involves the value system of the individual, and changes in that system. Extended clinical experience may provide some clues for interpreting various kinds of changes in patterns.

Implications for Further Study—This study suggests further investigations of the origin and development of value patterns, their effects in various kinds of interpersonal relations, and the character of changes that may be produced in pupil value patterns through counseling or selected group experiences. All of these investigations might be guided by the theory that values emerge from a variety of external and internal pressures and a series of past and anticipated experiences all cumulatively interacting within the individual. Further understanding of the origin and development of patterns of values within persons and of their effect on inter-personal relations may make it possible to improve the quality of education provided for boys and girls and may facilitate the discovery of methods to improve human relations in many situations.

REFERENCES

1. Allport, Gordon W., and others. Study of Values, revised (New York: Houghton Mifflin Co., 1951).
2. Battle, Haron J. Application of Inverted Analysis in a Study of the Relation Between Values and Achievement of High School Pupils, unpublished Ph. D. dissertation, University of Chicago, 1954.
3. Bennett, G. K., and others. Differential Aptitude Tests (New York: Psychological Corporation).
4. Dunkel, Harold Baker. General Education in the Humanities (Washington, D. C.: American Council on Education, 1947), p. 28.
5. Havighurst, Robert J. Developmental Tasks and Education (Chicago: University of Chicago, 1948), pp. 27-63.
6. Holzinger, Karl J. Student Manual of Factor Analysis (Chicago: Department of Education, University of Chicago, 1937), pp. 15-20.
7. Murray, Henry A., and others. Explorations in Personality (New York: Oxford University Press, 1938).
8. Murphy, Gardner. Personality—A Bisocial Approach to Origins and Structure (New York: Harper and Brothers, 1947), pp. 272-83.
9. Remmers, H. H. and Shimberg, Benjamin. SRA Youth Inventory and Examiner Manual for the SRA Youth Inventory (Chicago: Science Research Associates, 1949).
10. Rogers, Carl R. Client-Centered Therapy (New York: Houghton Mifflin Co., 1951), p. 149.
11. Rothney, John W. "Evaluative Attitudes and Academic Success," Journal of Educational Psychology, XXVII (1936), pp. 292-98.
12. Stephenson, William. The Study of Behavior (Chicago: University of Chicago Press, 1953), pp. ix + 376.
13. Smith, Eugene R., and others. Appraising and Recording Student Progress (New York: Harper and Brothers, 1942).
14. Woodruff, Asahel Davis. A Study of the Directive Factors in Individual Behavior (Chicago: University of Chicago Libraries, 1941), pp. 24-68.

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IMPROVING RATE, VOCABULARY AND COMPREHENSION IN READING BY THE INVERSION TECHNIQUE*

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Problem

THE PILOT study for this particular investigation was first published in 1952 (1:84-88). The purpose of this initial study was to determine whether there might be any significant difference in the rate of reading when comparing the conventional method of teaching reading from left to right and a method termed the inversion technique as proposed by the writer. According to the pilot study, the inversion technique appears to increase the rate of speed in reading as contrasted to the conventional pattern of reading instruction, the difference being significant at the .01 percent level of confidence. The question then arises, is it possible that vocabulary and comprehension may be affected similarly?

Inversion reading as defined in this study, refers to reading all even lines, e.g., (2, 4, 6, etc.,) from right to left, with words reversed, but the spelling remaining similar as in conventional reading from left to right. All odd lines, e.g., (1, 3, 5, etc.,) are read from left to right. An example of inversion reading is as follows:

> Quite often teachers are interested in learning just how teaching in involved standards various to up measure may they situations. Not complete in any sense, but suggested as a guide desirable toward growth this ascertain to teachers assisting in standards are the following tentative teacher patterns sometimes do How . relationships teacher-pupil in invaluable as described you think you might rank relative to these patterns?

This study has been designed to evaluate three aspects of reading as taught by the inversion technique versus the conventional method, namely, (a) Rate, (b) Vocabulary, and (c) Comprehension. To draw inferences and possible conclusions, three groups have formed the framework of the study, i.e., a control group, a conventional group and an inversion group.

Methods

Subjects and General Plan—The subjects for this study consisted of 300 individuals of Newfoundland and Canadian descent, 148 females and 152 males. The subjects were living either on a United States Air Force Base or in the vicinity of Stephenville, Newfoundland. The age range of the subjects extended from 17 through 34. The formal educational training received by this group extended from grade 7 through 11.

Equating Procedures for the Three Groups—With the purpose of the study defined, the next step involved the selection of measuring devices which could be used for equation purposes relative to rate, vocabulary, and comprehension. For this purpose, six standardized tests were chosen, namely, (a) Sentence Vocabulary Scale, Form I, Series B, grades VII to XII; (b) Test for High School Entrants, Form B; (c) English Vocabulary Tests for High School and College Students, Form I; (d) Public School Attainment Tests for High School Entrance which included the Traxler Silent Reading Test, Tressler Eng-

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lish Essentials Test and the Rinsland-Beck English Usage Test; (e) American Council on Education, Cooperative English Test, Test C2; Reading Comprehension, Form T, and (f) Henmon-Nelson Tests of Mental Ability, grades VII-XII.

After administering the six standardized tests, the 300 subjects were divided into three groups, namely, (a) Control, (b) Conventional, and (c) Inversion, N equal to 100 in each group. The criteria used for equation purposes were sex (a few exceptions had to be made due to the unequal distribution of the sampling), chronological age, mental age, intelligence quotient, reading vocabulary, reading rate, and reading comprehension. In pairing the subjects for each of the three groups, an attempt was made to classify them so that they would be approximately equivalent in the skills to be measured.

Each of the three groups (control, conventional, and inversion) was further broken down into sub-groups of fifty subjects. This was necessary to facilitate instructional plans. Each of the six sub-groups attended class on a voluntary basis for one hour per week on either Monday, Wednesday, or Friday. The classes met at either 7:00 - 8:00 P.M., or 8:00 - 9:00 P.M. The class meetings began in February 1951 and concluded in July 1951. Each group spent an estimated six months in study devoting approximately twenty-six hours to classwork. One individual taught all groups.

Differentiations in Teaching Groups—The control group was subjected to no teaching at all. The subjects merely met for one hour per week, studied various topics of interest to the individual or the group, discussed the material read with other members of the class participating. The instructor gave advice and suggestions only upon request. Periodically, for purposes of comparison with the conventional and inversion groups, the control group was provided the same reading material. The control group was informed at the outset of the experiment that they would be subject to testing at specific intervals. The meetings of the control group were comparable to the Great Books discussion plan.

The conventional group was given no training in the skill under consideration, i.e., the inversion technique of reading. The usual type of reading prevailed. The instructor advised the groups as to the varied reading skills, work-study habits, assisted individuals in their respective reading problems, and guided the discussions. The reading materials of the conventional group were identical to the inversion group.

The inversion group was subjected to the inversion technique of reading. The first hour for this group was devoted to an orientation period describing the various advantages and disadvantages of the conventional and the inversion technique of reading. All reading materials after the first class meeting were mimeographed and typed according to the inversion system. During the six-month period, no conventional form of reading materials were used in classwork.

The first meeting for each group was more or less a "get-acquainted" period. All groups were given periodically the same assignments, referred to the same reading sources, and provided opportunities to see educational films and take sample tests. Hence, the students in all groups were afforded a common core of readings, movies, test demonstrations, and supplementary assignments. No explicit announcement was made to the students that an experiment was in progress.

During the fifth and sixth months, three assigned topics were given to the groups. The first was entitled, "The Meaning of Health" (2:17-20). The second topic consisted of a series of short articles entitled, "Before Paper and Pen," "Clay Tablets," "Papyrus," "Parchment," "Paper," and "Writing Implements and Ink" (3: 105-115). The final assignment was entitled "Education for Today and Tomorrow," (4:1-65). In order that the final assignment could be handled easily within the class hour, the book was read in four sections, one section being read each class period.

Stimulating Students' Participation in Classwork—To motivate students in classwork, the instructor followed several plans, and the purpose of reading was discussed by all students. Students were encouraged to read voluntarily any articles of interest to them. The reticent type of student was asked to bring readable materials to class to be read silently or aloud. Provocative questions on reading materials were occasionally given by the instructor or members of the class. Questions were sometimes given to the groups so that they could write out their answers. Finally, volunteer students looked up facts and potential solutions to problems.

An effort was made by the instructor to terminate each class meeting in such a manner that each student would leave with a feeling that it was purposeful and meaningful to him. No grades were given to any group, thus allowing the student more freedom in revealing his strengths and weaknesses. The students introduced themselves to the group on the first day of meeting. The instructor used either the first or last names of students (omitted Mr., Mrs., and Miss) to create an atmosphere of informality.

The speed of reading the various assignments was recorded by an electrical timing device placed in front of the room so that it was clearly visible to all members of the class. Each student recorded his own time of reading in seconds.

Results

On the bsis of administering the six standardized tests, the subjects were paired and put into either a control, conventional or inversion group. The groups were well matched with respect to the mean and standard deviation in all variables, except in the case of the "Conventional" and "Control" groups on the Henmon-Nelson Tests of Mental Ability, where the difference in means equalled 4.64 points, with D/σ_D equalling 3.07. It is not particularly surprising to discern this significant difference in the intelligence quotient between the control and the conventional group. It can be attributed to the pairing system used by the experimenter, which, stated simply, was: either more individuals who achieved high scores in I.Q., were placed in the control rather than in the conventional group, or contrarily, a larger number of the subjects who earned lower I.Q.'s were placed in the conventional group.

To gain insight into the probable differences of the three groups as related to vocabulary, comprehension, and speed in reading, three objective tests were administered in the following subject matter areas: (a) Health Education, (b) Social Science, and (c) Education. The results of these three tests are indicated in Table I. As one may note, in every instance the inversion group scores exceed both the conventional and the control group scores. In all results, save two, the conventional group scores are superior to the scores attained by the control group.

As Table I indicates, the inversion group has higher means for all factors measured except the speed scores. This pseudo reversal may be explained by the fact that speed in each instance indicates mean time in seconds, hence the lower mean speed rates actually indicate that the inversion group is really superior to the remaining two groups.

Although the obtained mean scores as listed in Table I seem to display a difference favoring the inversion group when compared to both the conventional and the control groups, we might ask at this point: Are these differences among the means of the three groups significant? Table II illustrates the $\frac{D}{\sigma(\text{diff.})}$ ratios of these differences. The $\frac{D}{\sigma(\text{diff.})}$ ratios are greater than 3.00 on all items when comparing the inversion group with both the control and the conventional group; thus the differences may be considered highly significant.

Reliability—Progressing further in this analysis of the objective tests as administered to the three groups, the experimenter was interested in ascertaining just how much confidence could be placed in the tests as utilized. Table III indicates the Kuder-Richardson reliability coefficients as related to vocabulary, comprehension and entire test. The reliability coefficients ranged from .36 to .97. The mean reliability coefficients for the three tests are as follows: Health Education, r = .85; Social Science, r = .84, and Education, r = .95.

Validity—The items in each of the tests were carefully selected and checked by teachers and supervisors and test specialists. Studies of student responses on trial editions of each of the three tests were also made and utilized for revision purposes. Since this study was designed specifically to assess the probable differences in two different methods of teaching reading, it was concerned primarily with three factors: (a) Rate, (b) Vocabulary, and (c) Comprehension. To the degree that all instruction was directed toward these three variables, and tests were constructed to evaluate these characteristics, and supporting reliability coefficients are given for the tests, the procedure may be said to possess validity.

Summary and Conclusions

In equating the three groups in the beginning of this experiment, no significant differences between the mean scores achievedon the standardized tests were in evidence, save one, namely the intelligence quotient of $\frac{D}{\sigma(\text{diff.})}$ of 3.07, significant at the .002 level of confidence. This significant figure favors the control group over the conventional group. However, the intelligence quotient as revealed by the Sentence Vocabulary Scale Test indicated an approximate equivalence of 83.3 for both the control and conventional groups.

In comparing the $\frac{D}{\sigma(\text{diff.})}$ ratios of the differences between the means of the three groups as related to the three objective tests, significant differences were found for each of the variables (vocabulary, comprehension, entire test, and speed). These significant differences favored the inversion group in every instance when compared to the control and conventional groups. All $\frac{D}{\sigma(\text{diff.})}$ ratios are highly significant, exceeding 3.00 in every instance.

The Health Education, Social Science, and Education tests administered to the three groups seem to possess to some extent a fair degree of validity as related to the variables measured.

The mean reliability coefficients for the Health Education, Social Science, and Education tests were .85, .84, and .95, respectively.

The results of this experiment appear to indicate that the inversion technique of teaching reading is superior to the conventional method of

TABLE I

MEANS AND STANDARD DEVIATIONS OF OBJECTIVE READING TESTS

Type of Test	Groups, N = 100					
	Means			Sigmas		
	Control	Conventional	Inversion	Control	Conventional	Inversion
	(1)	(2)	(3)	(4)	(5)	(6)
Health Education						
Vocabulary	23.7	23.4	30.7	9.3	9.4	10.4
Comprehension	7.5	8.4	11.6	2.8	2.6	3.5
Entire Test	31.1	31.8	42.3	8.4	10.3	12.6
Speed	544.1	496.3	379.7	101.6	130.1	58.5
Social Science						
Vocabulary	16.3	16.6	20.7	6.4	6.3	6.4
Comprehension	17.2	17.8	21.5	5.7	6.6	6.4
Entire Test	33.5	34.4	42.2	10.8	10.0	10.3
Speed	810.3	758.6	605.6	94.9	68.7	65.9
Education						
Vocabulary	81.7	86.0	102.0	34.2	35.5	29.6
Comprehension	22.6	23.6	31.8	7.4	7.0	9.0
Entire Test	104.2	109.5	133.5	37.3	39.4	33.9
Speed						
Section A	801.7	719.8	657.6	63.3	63.0	59.4
Section B	864.3	828.2	767.2	39.0	31.9	43.2
Section C	1173.9	1120.7	1026.8	49.1	42.6	41.5
Section D	1155.6	1110.0	1025.8	112.9	35.2	35.2

TABLE II

$\frac{D}{\sigma(diff.)}$ RATIOS OF THE DIFFERENCES BETWEEN THE MEANS OF THE GROUPS ACCORDING TO OBJECTIVE READING TESTS

Type of Test	Groups, N = 100					
	Conven'l vs. Control	Inversion vs. Control	Inversion vs. Conven'l	Levels of Significance*		
	(1)	(2)	(3)	(4)	(5)	(6)
Health Education						
Vocabulary	.2	5.0	5.2	.82	<.001	<.001
Comprehension	2.2	9.2	7.4	.02	<.001	<.001
Entire Test	.5	7.4	6.5	.60	<.001	<.001
Speed	2.9	10.6	8.2	.03	<.001	<.001
Social Science						
Vocabulary	.3	4.9	5.0	.75	<.001	<.001
Comprehension	.7	5.0	4.0	.47	<.001	<.001
Entire Test	.6	5.8	5.4	.53	<.001	<.001
Speed	.4	17.7	16.1	.66	<.001	<.001
Education						
Vocabulary	.9	3.2	3.5	.38	<.001	<.001
Comprehension	1.0	7.8	7.2	.32	<.001	<.001
Entire Test	1.0	5.8	4.6	.32	<.001	<.001
Speed						
Section A	9.2	16.6	7.2	<.001	<.001	<.001
Section B	7.2	16.7	11.4	<.001	<.001	<.001
Section C	8.2	22.9	15.8	<.001	<.001	<.001
Section D	3.9	11.0	16.9	<.001	<.001	<.001

*A ratio of 3.30 is significant at the .001 level.

TABLE III

KUDER-RICHARDSON RELIABILITY COEFFICIENTS OF OBJECTIVE READING TESTS

Type of Test	Groups, N = 100			
	Control	Conventional	Inversion	Mean
	r	r	r	r
Health Education				
Vocabulary	.88	.88	.91	.89
Comprehension	.42	.36	.70	.51
Entire Test	.78	.86	.92	.85
Social Science				
Vocabulary	.79	.79	.80	.79
Comprehension	.87	.84	.84	.85
Entire Test	.86	.83	.85	.84
Education				
Vocabulary	.97	.97	.95	.96
Comprehension	.79	.76	.86	.80
Entire Test	.96	.96	.95	.95

teaching reading. Ample proof seems to exist illustrating that vocabulary, comprehension, and rate can be accelerated when carefully controlled throughout the teaching procedure.

Some Tentative Implications

By using the inversion technique, the Braille Code for the blind could be adjusted to increase rate as well as vocabulary and comprehension in reading.

From a theoretical standpoint, a typewriter designed to print in accordance to the inversion technique could increase rate of typing for stenographers in business and industry.

The inversion technique is designed basically for reading purposes, not writing. Comparable to shorthand, it may be cited as a short-cut method in increasing rate, vocabulary, and comprehension in reading.

From a printer's standpoint, inversion texts should be no more difficult to publish than either shorthand or foreign language texts.

REFERENCES

1. Blanchard, B. Everard. "An Experiment in Increasing Speed in Reading," Bulletin of the National Association of Secondary-School Principals (January 1952).

2. Williams, Jesse F. Personal Hygiene Applied (Philadelphia: W. B. Saunders, 1922).

3. Tanner, Rollin H., and others. Adventures in Language (New York: Prentice-Hall 1941).

4. Reeves, Floyd W. Education for Today and Tomorrow, The Inglis Lecture (Cambridge: Harvard University Press, 1942).

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GROWTH OF SCHOOL ATTENDANCE AND LITERACY IN THE UNITED STATES SINCE 1840

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THIS PAPER presents a record of the growth of school attendance and literacy in the United States as a whole and in three geographical-cultural sections existing in 1861.[1]** It covers a period of 110 years, from 1840 to 1950. It is based on data from the United States Census. The graphs and mathematical data presented emphasize facts that are already well known: (1) the slowness of development of school attendance, suggesting slow development of the type of society of which this feature is a function; (2) the distinctness of the three sections of the country in both school attendance and literacy in the early years with the disappearance of this distinction in recent years; (3) the enormous handicap which the South of 1870 faced, in comparison with the North, in the march toward universal schooling and literacy.

Underlying Thesis

The growth of school attendance in a democratic society is a complex phenomenon. Four interpenetrating steps may be distinguished in this growth: (1) social changes which make schooling necessary; (2) recognition of the need for schooling by leaders; (3) the awakening of the public to a consciousness of this need; (4) providing by the awakened public of schools and the machinery for operating the schools. The outcome of this social process is an increasing school attendance and increasing literacy—more children attend school and to more advanced years.

This study ignores the steps and looks only at the outcome. Today we operate schools on the assumption that all children and youth between the ages of six and eighteen (the 6-17 age-group) should be in school. Obviously such was not an underlying assumption in 1840, nor was it a social need nor even a practical possibility before the twentieth century. Yet this modern day standard has provided the unit with which all earlier periods are measured; i.e., the percentage of the 6-17 age-group enrolled in school.

A factual reporting of school attendance at different stages of a society's development and in different cultural groups within that society is in no sense an evaluation of that society or of its cultural groups. It provides only an index of the rate at which a defined social process is advancing. This thesis has provided the underlying orientation for the study here reported. This study undertakes to show the growth of school attendance as an index of social change, the rate of this growth, the variation in rate in different sections of the country. In light of the present existing situation it undertakes to answer the questions: How far had American society moved by 1840 toward the achievement of its present goal? What, from the point of view of this goal, was the task ahead in 1840 and at succeeding periods and how did different sections of the country differ in regard to the magnitude of that task? The major task facing the nation was, of course, that of the complex social evolution which has made modern America; school attendance was merely an incident in this larger social process. It is only this incidental aspect of the total that is here considered.

The thesis just stated demands that the slaves of the pre-Civil War period be included in the data. The slaves were people; they were a part of the population for which the goal of 1950 demands literacy and school attendance. Hence the questions proposed cannot be answered until they are included. No claim is made that the standards or conditions of 1840 demanded that slaves be given schooling, no more than that these standards demanded schooling for all youth of high school age, or, for that matter, of all children at any age level. A different type of comparison which attempted evaluation in the pre-Civil War period would, of course, make a different approach.

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**All footnotes will be found at end of article.

The Measure of School Attendance

The measure of school attendance used is the percentage of this 6-17 age-group attending school. The United States Census had to be relied on for data for the years before 1890 and was made the sole source of data. The census reports of the number of individuals who gave affirmative answer to the question: Did you attend or enroll in school at any time during the census year (or some designated part of that year), provided the data used in calculating the percentages.[2]

Obviously, a measure of attendance that gave the number of days attended during the year would be more meaningful than one that merely gives the number of children who enrolled in school at some time during the year. No such measure is available over the period covered. It should be clearly understood that the measure used is a very coarse one, and that "school attendance", in this paper, has a much narrower meaning than it usually carries. It means merely enrolling in a school at some time during the year and implies nothing as to length of school term or regularity of attendance.

Nature of the Data on School Attendance

A number of factors involved in taking the census and reporting the data rendered even this coarse measure less certain when comparisons are made from one census period to another. After careful study of the records the writer is convinced, however, that the data are sufficiently comparable to justify the use of them in this report.

1. The 1840 Census did not give the report by individuals on school attendance but only the report by schools. The data included here for 1840 are therefore those of the institutional report. These are only roughly comparable with the data for later years. Where both types of reporting attendance were given (Census of 1850, 1860, 1870, 1890) appreciable differences between the two occurred in the data from many of the states, a fact to which the statisticians of the census called attention and for which they gave not very convincing explanations (4:144; 5: lvi; 8:448-9; 20:Part I, p. 45).

2. The question about school attendance to which individuals replied varied somewhat from one census to another in its definition of school and in its specification of length of time included. As noted above, the question had to do with whether the individual had attended or enrolled in any school for any length of time during the year. In 1850, the first year this type of data was secured, the marshals were directed not to include attendance at Sunday School (4:144). In 1920, the question was stated as "attending school, college, or any kind of educational institution" (16:10). This was obviously not a broadening of the meaning to be given to school but merely an attempt to insure that the earlier scope not be narrowed. However, in 1940, the word 'regular' was inserted in the question (19:11), and in 1950 a regular school was defined as being a school which leads to elementary or high school diploma or to college or university degree (20:I, p. 44), thus excluding many types of schools which had been included in the earlier reports. The statistician who discussed the data in the 1950 Census called attention to this limitation on comparability of data.

The period of time for which the individual reported was generally stated to be the school year during which the census was taken. Some variations were, however, made in this, as: "census year ending May 31, 1890" (13:266); "since September 1, 1929," census inquiry being made in April 1930 (18:10); "between March 1 and April 1, 1940" (19:11); and "at any time since February 1, 1950" (20:I, p. 44). It is stated in the census report of 1940 that this shortening of the period of time "undoubtedly" reduced the number reported as attending school, a fact noted in planning the 1950 census and leading to the extension of the time by one month.

It seems probable that the changes noted above did not affect the comparability of the data before 1940 but that the figures for 1940 and 1950 were lowered by them.

3. The data given in the census reports before 1910 did not make possible exact determination of the number of children in the age group, 6-17, who were attending school; approximations have, therefore, to be relied on. The method of making these approximations is here explained. For the years 1840-1870, the census gives only totals of all ages attending school. While it was possible to eliminate from this total, by using data from the institutional report of school attendance, the number attending college and university, there was no way of eliminating the underage and overage children, if any, who were in the lower schools. For these years, therefore, school attendance figures include all, regardless of age, who were enrolled in schools below college level and exclude any below eighteen years of age who were in college. It is here assumed that, in relation to total school enrollment, the number of those outside the age-group 6-17, attending school in these early years was too small to affect seriously the percentages computed. On the whole, this seems a reasonable assumption yet the data from New England seriously challenge the assumption for that section of the country (see page 34).

Data for 1890 present a lesser difficulty. School attendance is there reported by age groups, each group covering a five-year span. It was

thus possible to secure directly from the census figures for the attendance of the 5-19 age group. These are the figures used in this study. Attention is called to the fact that the figures for school attendance in 1890 include some college and university students (those 18 and 19 years old), while from the figures used for the earlier years these had been eliminated. The institutional report for 1890 gives the total college and university attendance (12: Education, pp. 123, 125), but any attempt to estimate the proportion of the total included in the 18 and 19 year-old group would be little better than a pure guess. Nor would the elimination of this group, if known, materially change attendance percentages that were obtained. A check for the United States as a whole, on the estimate that the 18-19 age-group contained half the total, reduced the school attendance measure from 68% to 67% only.

To summarize, this study assumes that the data used give a reasonably close approximation to the number of children of the age-group, 6-17, who attended school during each census year and designates the unit used in reporting school attendance as the percent of that age-group who were attending school. The facts, however, are: (a) From 1840 to 1870 inclusive, the number represents the total in the entire population attending schools below college level; (b) the number for 1890 is the total of the age-group, 5-19, attending any level of school; (c) only for 1910 and later is the number accurately limited to the age-group designated.

4. The determination of the total population in the age-group 6-17 (the base used in calculation of attendance percentages) involved interpolation in the early census years.

The census reports for 1840, 1850, and 1860 gave population data for the whites in the age-groups 5-9, 10-14, 15-19. To secure the 6-17 age-group, it was necessary to eliminate from the above totals the 5-year-olds and the 18- and 19-year-olds. This was done by assuming that there was an even spread of the population over each of the two age-groups involved, an assumption known to be inaccurate. Any other procedure seemed less sure. Moreover, the errors were relatively small and those accruing in handling the 5-year-olds tended to be negatived by those coming in from the 18- and 19-year olds. The census data for the years 1870 and 1890 made necessary the elimination of the 5-year-olds only. For the years 1910, 1930, and 1950, the data needed in calculating the age-group 6-17 were secured directly from the volumes of the census.

The census report for 1840 necessitated more extended interpolation of data for the Negro population since the groupings reported for both slaves and "free colored" were "under ten" and "ten and under twenty-four." Obviously, the assumption of an even spread of this population over these long periods would produce large errors. Two plans of adjustment were considered: (1) to apply to 1840 data the proportions existing for the Negro population in 1870, the first year in which census data made possible securing such a ratio; (2) to apply to the Negro population the ratio existing among the whites in 1840. The latter plan was decided on to provide the basic ratios, though a small adjustment was made by moving this figure toward that of the 1870 ratio. The two ratios differed only slightly. The ratios used were: for the 0-9 age-group, one-third instead of the four-tenths which an assumption of even spread would have given; for the 10-23 group, .64 (rather than eight-fourteenths). From 1850 on, the age groupings reported for Negroes were the same as those for the white population, and the assumption of even spread within the five-year groups was made for the Negroes as for the whites. Beginning in 1870, the Negro and the white populations were, of course, reported together.

The Measure of Literacy

The measure of literacy used is the percentage of the designated age-group (not the percentage of the total population) that were literate. A literate person in this study is one who was not classed by the census as illiterate. The census defines an illiterate as one who answered negatively the question: Can you read and write? The Census of 1870 separated these abilities, asking two questions, and made writing the necessary skill. This policy was continued until (but not including) 1930. The 1930 Census returned to the earlier plan of one question. The statistician of that report notes, "illiteracy has been defined (1870-1920) as inability to write 'regardless of ability to read.'"(17:1219) As defined above, literacy is a very coarse measure of education.

Nature of the Data on Literacy

1. For the years 1840-1860, illiteracy data are given for the population twenty years old and over; from 1870 to 1930 inclusive, the data are for the population ten years old and over. This change did not affect the illiteracy percentage of the United States as a whole in 1870, though it raised the figures for the later years by approximately one percent (from 13.3% to 14.6% in 1890 and from 4.3% to 5.1% in 1930).[3] Because these differences are small, the illiteracy data are considered to be comparable throughout the study.

2. Illiteracy figures were not reported after 1930. The author manufactured a figure for 1950 by using the number in the population ten years old and over who had not completed one

year of schooling. The justification for designating this group the illiterate group is along two lines. (a) In the 1930 Census the interpretation of illiteracy contains the statement: "In general, the illiterate population as shown by the census may be assumed to comprise only those persons who have had no education whatever" (17:1219). The lowest educational group reported in 1950 is the group which has completed less than one year of schooling. (b) A rough estimate of illiteracy for the United States as a whole was made by the census statistician for 1950 (20:I, 47). The author's figure approximates this.[4]

3. Only for the year 1840, and only for the Negro population in that year, was interpolation necessary in order to determine the age-group, twenty years old and over. The principle used in making a similar calculation when working with school attendance (see page 27) was used here. The ratio used in determining the number to be included from the 10-23 age-group was .8; if an even spread over the fourteen years had been assumed, the ratio would have been .71.

4. In determining the total number of illiterates in 1840, 1850, and 1860, all slaves were assumed to be illiterate. While it is known that the laws against teaching slaves to read were not rigorously enforced and that some slaves received private instruction, it seems unlikely that any appreciable proportion of them learned to read and write. John Hope Franklin gives estimates made by two writers to the effect that probably one in 50 of the slaves in the Southwest were literate and one in 80 in Georgia (21:201). A check for Arkansas and Georgia showed that application of these ratios to the data in making the calculations would change the percentage of illiteracy for these states by less than one percent.

5. The 1840 Census gave an illiteracy report for whites only; in 1850 and 1860 the report is for the free population and tables differentiate these by race. In order to secure a figure for illiteracy in the "free colored" population of 1840, the assumption was made that the percentage of this group illiterate was the same in 1840 as in 1850. A check showed that no great change occurred between 1850 and 1860. Since illiteracy among free Negroes varied widely among the states (from 12.0% in Rhode Island to 69.6% in Delaware, with 41.3% for the United States as a whole), the 1840 figures for each state were secured by separate calculations, using for that state its 1850 illiteracy ratio. The heavy illiteracy among free Negroes in many of the states is in line with Franklin's data showing that schooling for free Negroes was generally provided in separate schools in the North, was given little attention in the West, and was frowned on in the South (21:225-27; 22:165).

Years Included in the Study

All census reports were made use of from 1840 to and including 1870. After 1870, only the data from alternate reports were included. It would have been interesting to include a report on the situation in 1880, but unfortunately the census data for that year are not comparable with those of other years, since only public school attendance is given (10:1635-37).

States Included in the Study

Because of the general nature and purpose of this study, the states that constituted the United States in 1860 are the only ones included. Also, since the states lying west of Minnesota and Iowa were few and small in population in 1860, these were not included. The District of Columbia was considered a state. The states included are, then, the eastern half of the nation, plus Texas. When data are given for the United States as a whole, these include all the states of Continental United States, as reported in the Census.

Sections of the Nation

The sections among which comparisons are made are the three relatively distinct geographical-cultural areas of 1861: (1) the South—the eleven states that made up the Confederate States of America; (2) the Free North—the non-slave states at the outbreak of the Civil War, with the limitation noted above; (3) the Border States—the slave states that did not join the Confederacy. This last group includes Delaware, Maryland, District of Columbia, West Virginia after 1860, Kentucky, and Missouri.

The data given for the Sections are not averages of the states that make up the section, but are totals arrived at by disregarding state lines and considering the section as a unit, in exactly the same way that the data for the United States as a whole were arrived at in the Census.[5]

FINDINGS

The United States as a Whole (Figure 1)

1. Only 40% of the children and youth between the ages of six and eighteen (children whom we today say should be in school) attended for any length of time schools of any kind in 1840. The march toward universal schooling was just begun.

2. Growth in school attendance has been continuous. (a) The period of most rapid progress was the decade, 1840 to 1850. (b) The Civil War caused a falling off in school attendance,[6] a decrease that was overcome by about 1880. (c) The period, 1910 to 1930 was a second period of

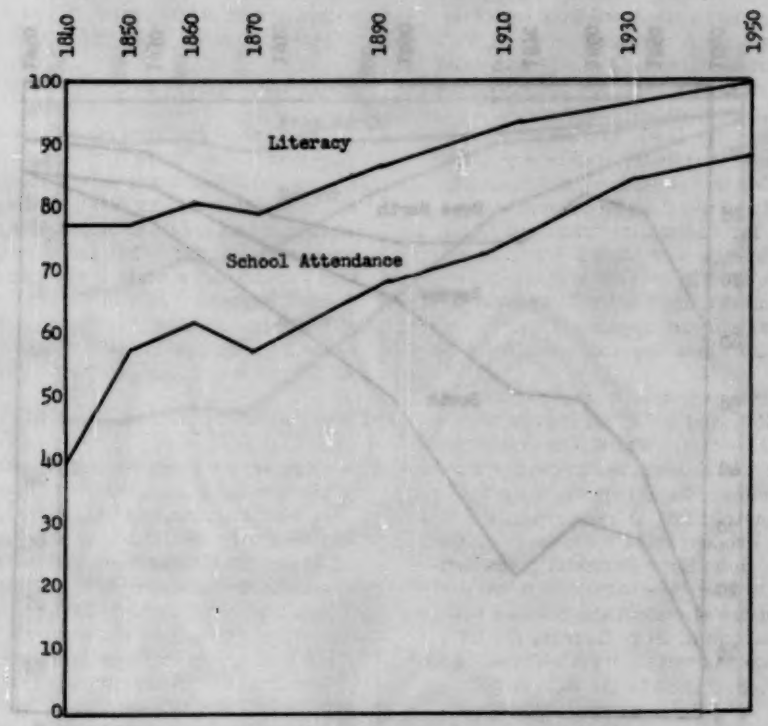

FIGURE 1

SCHOOL ATTENDANCE AND LITERACY IN UNITED STATES SHOWN IN PERCENTS AT THE DESIGNATED YEARS (BASED ON DATA IN TABLE III AND TABLE IV)

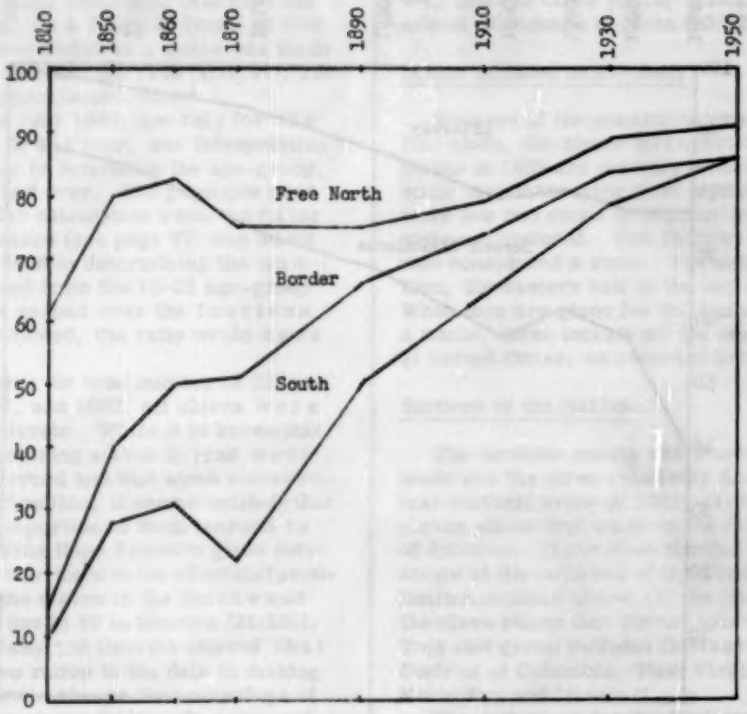

FIGURE 2

SCHOOL ATTENDANCE IN THREE SECTIONS OF THE UNITED STATES, SHOWN IN PERCENTS AT THE DESIGNATED YEARS (BASED ON DATA IN TABLE III)

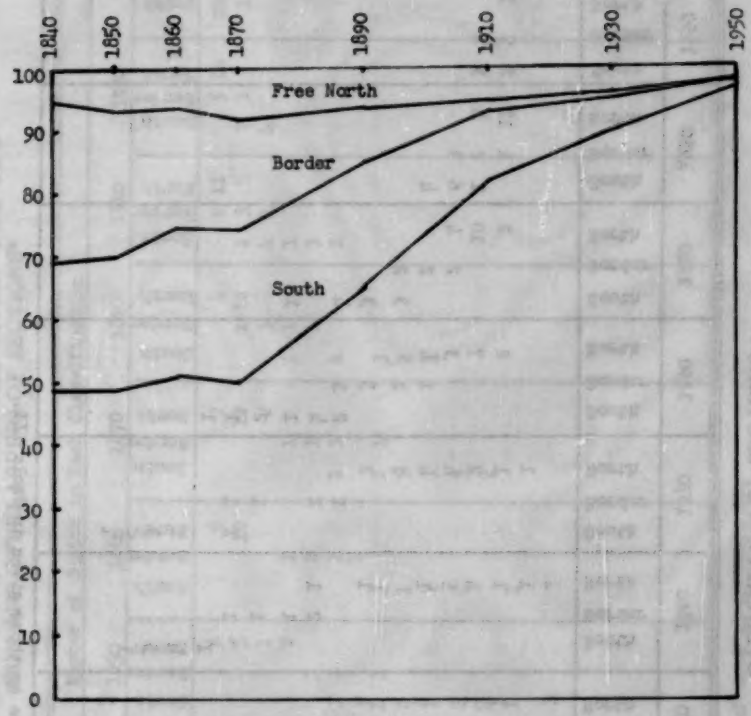

FIGURE 3

LITERACY IN THREE SECTIONS OF THE UNITED STATES, SHOWN IN PERCENTS AT THE DESIGNATED YEARS (BASED ON DATA IN TABLE IV)

TABLE I

SCHOOL ATTENDANCE: DISTRIBUTION OF THE STATES IN EACH OF THE THREE SECTIONS ON THE BASIS OF SCHOOL ATTENDANCE, SHOWING SPREAD WITHIN THE SECTION AND OVERLAPPING OF SECTIONS*

Percentage of attendance	1840			1850			1860			1870			1890			1910			1930			1950		
	South	Border	North	South	Border	North	South	Border	North	South	Border	North	South	Border	North	South	Border	North	South	Border	North	South	Border	North
100-			3			3			2															
95-99			1						1			1												
90-94						2			1			1			2			2		1	12	2	5	16
85-89			1			1			4			2			7			10	1	2	4	9	1	
80-84						3			5			4			3		2	4	6	3				
75-79			2			1			1			4		1	4		2		4					
70-74												2			1	3	2							
65-69						4			1			2			3	3								
60-64						1					2		2	1		4								
55-59								2	1		2		4											
50-54			2		1			1					1			1								
45-49			1		2			1			1		2											
40-44			1	1	1			1		1	1		1											
35-39		1		2	1		1						1											
30-34			1	1			4			1														
25-29			2	5			3			3														
20-24				2			3			5														
15-19		3	1			1				1														
10-14	9	1																						
5- 9	1																							
0- 4																								

* Sources of data the same as those given in Table III.

TABLE II

DISTRIBUTION OF STATES IN EACH OF THE THREE SECTIONS ON BASIS OF LITERACY, SHOWING SPREAD WITHIN THE SECTION AND OVERLAPPING OF SECTIONS*

Percentage of literacy	Number of States in Each Classification																							
	1840			1850			1860			1870			1890			1910			1930			1950		
	South	Border	North	South	Border	North	South	Border	North	South	Border	North	South	Border	North	South	Border	North	South	Border	North	South	Border	North
95-99			9			8			6			2			4		2	11		5	16	10	6	16
90-94			4			5			10			12		1	12	1	3	5	7	1		1		
85-89			2			1						2			3		4	1		4				
80-84						2		1			1		1	1			1							
75-79					3			2			1			1			3							
70-74		4			1			1		1	3		4				2							
65-69		1						1																
60-64	2			1	1		3			1	1		3											
55-59				2			1			1			2											
50-54	3			1			2			1			1											
45-49	3			2			4			5														
40-44	1			4						2														
35-39	1			1			1																	
30-34																								
25-29																								
20-24																								
15-19																								
10-14																								
5- 9																								
0- 4																								

*Sources of data as in Table IV.

rapid increase, reflecting the rapid expansion of high school education.

3. The task of liquidating illiteracy was much nearer achievement in 1840 than was that of universal schooling, only a little more than 20% being classed as illiterates.

4. Development of literacy beyond the 1840 level began in 1870 and has been steady since that date.

5. Comparison between literacy data and school attendance data suggests that literacy was often acquired without school attendance (in line with what is known to be a fact). Of course the fact shown in the chart does not prove the statement just made.

The Sections

1. On the basis of both measures used in this study, the three Sections—South, Border States, and Free North—were distinct (Figures 2 and 3). There was large homogeneity among the states within each Section and very little overlapping between Sections until after 1910 in school attendance, and 1890 in literacy (Tables I and II). The one exception to this was in 1840 when the states that constituted the Free North were spread over almost the entire range in school attendance. By 1850 this group of states was distinct.

2. The Free North before 1890 was made up of three distinct areas—New England, Middle Atlantic, and Middle West—in the trait, school attendance (Figure 4). The differences in literacy, clear but not large in 1840, had largely disappeared by 1860[7] (Figure 5). In 1840, New England was far in the lead in school attendance and the Middle West was a poor third. The Middle West surpassed the Middle Atlantic area in 1860. New England maintained its supremacy until 1890 when its record was approximated by the Middle West. After 1910 it lost the lead entirely.

3. The most distinctive characteristic of New England in school attendance, however, was its steady decline from 1840 to 1890 (Figure 4). That some unidentified factor was operating to render the measure of school attendance inaccurate and the figures abnormally high in the case of Maine, Vermont, and New Hampshire (and possibly also in Connecticut and Massachusetts) is obvious. The steady decline shown may mean nothing more than the elimination of this extraneous factor. However, industrialization and immigration could also have been causes of a real decline. What the extraneous factor was is not at all clear. Richey, who used the institutional report of school attendance in his study, attributes the excessively high record before 1860 in part to duplications resulting from the fact that individuals attended more than one school in the course of a year, or even simultaneously (1:122-23). Since, however, the high attendance record continued through 1850 and 1860 where the author's study uses the report of individuals on their school attendance, duplications are seen not to be the major cause of the discrepancy. An assumption that attendance at Sunday school or Church services was being reported can be made only with the additional hypothesis that the marshal failed to secure adherence to the instruction given in 1850 that Sunday school attendance be excluded. A possible explanation is that the social climate of New England during this period resulted in large numbers of youth and adults over the age of 17 attending schools or classes of special types and widespread attendance of children under six years of age at infant schools.

4. Comparisons among the three major Sections (Figures 2 and 3; Tables III and IV) are:

a) The curves for school attendance and literacy in each of the three sections show the same general characteristics as those for the nation as a whole.

b) In both literacy and school attendance, as defined and measured in this study, the Sections began far apart in 1840, were fairly close together by 1910, and showed no major difference in 1950.[8]

c) The Border States were closer to the South on both criteria in 1840. By 1860 this Section was closer to the Free North in literacy and by 1890 in school attendance also.

d) The Border was the only Section that did not show loss in school attendance during the Civil War decade. The South lost more heavily than did the Free North. The actual decrease in school attendance, that in the white population, was decidedly greater than is shown by the method of reporting used in this study.

e) The Free North was slow in improving its school attendance after 1870. It was not till after 1910 that it reached its status of 1860.

f) The South quickly overcame its 1870 decline in school attendance. By 1880 its record was well above that of 1860. Indeed, during the period, 1870-1890, growth of school attendance in the South was almost as rapid as it had been in the decade, 1840-1850.

g) Although progress in school attendance in the South was rapid and steady after 1870, the starting point was so low that it was not till 1930 that the South exceeded the Free North's low of 1870.

h) The Free North had achieved a high level of literacy by 1840. It lost ground before 1870. Not till 1910 did it recover its 1840 level.

i) The Border showed appreciable gain in literacy between 1840 and 1860 and rapid gain from 1870 to 1910. By 1910 its status was close to that of the Free North.

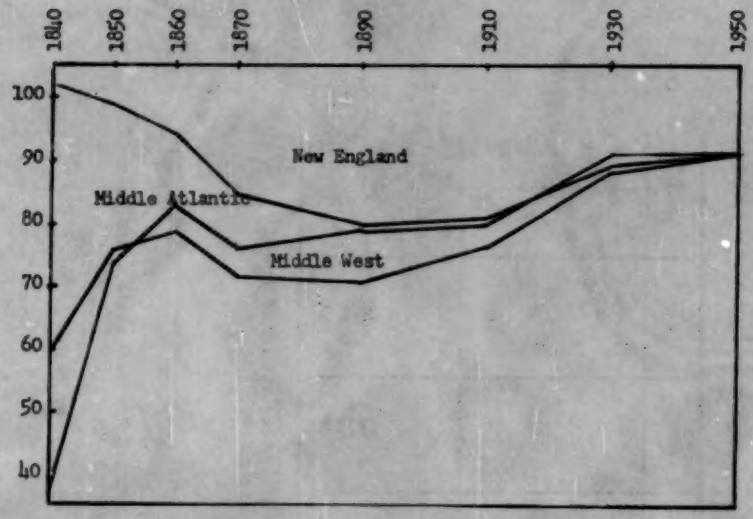

FIGURE 4

SCHOOL ATTENDANCE IN THREE AREAS OF THE FREE NORTH, SHOWN IN PERCENTS AT THE DESIGNATED YEARS

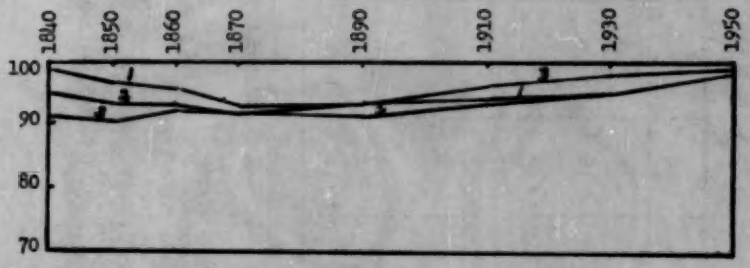

FIGURE 5

LITERACY IN THREE AREAS OF THE FREE NORTH, SHOWN IN PERCENTS AT THE DESIGNATED YEARS:

1. New England
2. Middle Atlantic
3. Middle West

TABLE III

SCHOOL ATTENDANCE, 1840-1950—PERCENT OF AGE-GROUP, 6-17, ATTENDING SCHOOL

	a 1840	b 1850	c 1860	d 1870	e 1890	f 1910	g 1930	h 1950
Free North	61	80	83	76	76	79	89	91
Border	15	40	50	51	67	74	83	86
South	10	28	31	22	50	64	78	86
United States	39	58	62	58	68	74	86	89
Areas within Free North								
New England	102	99	94	85	80	81	89	91
Middle Atlantic	60	77	79	72	71	77	88	91
Middle West	37	74	83	77	79	80	91	91

Percentages derived from the two factors, number of school age and number attending school, each of which was calculated from data given in census reports as follows:

a. Ref.3, pp.474-75.
b. Ref.4, page 102; Ref.5, page lix; Ref. 8, page 457.
c. Ref.6, pages 592, 594; Ref.8, pages 395, 456.
d. Ref.7, page 452; Ref.9, page 563; Ref.8, pages 394, 454, 461-70.
e. Ref.11, page 733; Ref.12, page 2.6-103 (Table 2 in detailed returns for each state), and 138.
f. Ref.14, page 221; Ref.15, Table I in detailed returns for each state.
g. Ref.17, pp.1102-1105, 1122-31, 1097.
h. Ref.20, Part I, pages 95, 206; and in detailed returns for each state, Tables 18 and 62.

TABLE IV

LITERACY, 1840-1950—PERCENT OF AGE-GROUPS, 20 AND OVER, 1840-1860, 10 AND OVER, 1870-1950, NOT REPORTED AS ILLITERATE

	a 1840	b 1850	c 1860	d 1870	e 1890	f 1910	g 1930	h 1950
Free North	95	93	94	92	93	95	97	98
Border	69	70	75	74	86	93	96	98
South	49	49	51	50	66	82	90	97
United States	78	78	81	80	87	92	96	98
Areas within Free North								
New England	99	97	96	93	94	95	96	98
Middle Atlantic	95	94	94	92	91	94	96	98
Middle West	91	90	93	92	94	97	98	99

Percentages derived from the two factors, number of literates and population in the designated age-group. Each factor was calculated from data in the census volumes, as follows:

a. Ref.3, pages 474-5 and last table, "Epitome of the Whole Population," in detailed returns from each state; Ref.4, page 70; Ref.7, page 458.
b. Ref.4, pages 82,88,102; Ref.7,page 459.
c. Ref.6, pages 594-5 and Table 1 in detailed returns for each state; Ref.7, page 458.
d. Ref.7, page 456; Ref.9, pages 560,563.
e. Ref.13, page 301.
f. Ref.14, page 245.
g. Ref.17, page 1229.
h. Ref.20, Part I, pages 223,236; and in detailed returns for each state, Tables 64 and 65.

TABLE V

SCHOOL ATTENDANCE, BY STATES, 1840-1850—PERCENT OF AGE-GROUP, 6-17, ATTENDING SCHOOL*

	1840	1850	1860	1870	1890	1910	1930	1950
Maine	114	108	110	95	86	80	90	89
New Hampshire	114	106	103	89	78	80	88	91
Massachusetts	94	91	85	82	79	81	90	91
Connecticut	85	89	82	77	77	79	87	91
Vermont	103	105	96	84	79	84	87	90
Rhode Island	73	78	74	66	71	75	86	90
New York	77	82	80	73	72	79	89	91
New Jersey	51	65	66	65	69	77	88	91
Pennsylvania	38	74	80	72	71	75	86	91
Ohio	47	82	86	82	79	80	91	91
Indiana	23	67	80	75	78	79	89	90
Illinois	25	66	81	72	76	77	88	91
Michigan	48	86	89	79	78	82	91	92
Wisconsin	29	66	83	79	79	79	89	91
Iowa	13	57	83	84	88	83	91	91
Minnesota		15	57	74	76	82	89	91
District of Columbia	17	43	44	56	66	79	91	91
Delaware	33	50	56	54	63	74	86	88
Maryland	16	35	40	45	59	70	82	88
West Virginia				59	68	77	82	87
Kentucky	12	40	49	41	63	71	79	91
Missouri	15	43	55	60	73	78	86	88
Virginia	12	24	31	18'	55	65	78	85
North Carolina	8	36	36	19	48	69	80	86
South Carolina	9	19	20	19	40	59	74	84
Georgia	11	24	27	20	44	61	76	86
Florida	11	18	19	22	61	62	82	90
Alabama	11	25	31	24	43	58	77	87
Mississippi	9	24	27	15	57	69	83	86
Louisiana	7	24	24	23	35	50	78	88
Tennessee	11	43	44	29	59	69	80	86
Arkansas	9	33	29	41	57	67	82	87
Texas		28	32	25	56	67	77	85

* Sources of data the same as those given in Table III

' For the original state of Virginia, the figure is 29%

TABLE VI

LITERACY, BY STATES, 1840-1950—PERCENT OF AGE-GROUPS, 20 AND OVER IN 1840-1860, 10 AND OVER IN 1870-1950, NOT REPORTED AS ILLITERATE*

	1840	1850	1860	1870	1890	1910	1930	1950
Maine	98.6	97.8	97.4	96.1	94.5	95.9	97.3	98.6
New Hampshire	99.3	98.3	97.5	96.2	93.2	95.4	97.3	98.6
Massachusetts	98.7	95.1	93.4	91.6	93.8	94.8	96.5	97.6
Connecticut	99.3	97.5	96.7	93.0	94.7	94.0	95.5	97.4
Vermont	98.4	96.3	94.9	93.2	93.3	96.3	97.8	98.9
Rhode Island	96.9	95.7	93.9	87.4	90.2	92.3	95.1	97.5
New York	95.6	94.0	94.2	92.9	94.5	94.5	96.3	97.1
New Jersey	93.9	92.3	93.4	91.7	93.5	94.4	96.2	97.9
Pennsylvania	94.7	93.2	94.3	91.4	93.2	94.1	96.9	98.0
Ohio	94.0	92.7	94.2	91.1	94.8	96.8	97.7	98.8
Indiana	85.5	82.6	89.6	89.4	93.7	96.9	98.3	99.0
Illinois	85.8	88.9	92.6	92.6	94.7	96.3	97.6	98.5
Michigan	97.6	95.5	96.1	93.9	94.1	96.7	98.0	98.7
Wisconsin	89.8	95.7	95.5	92.6	93.3	96.8	98.1	99.1
Iowa	94.1	90.0	93.4	94.5	96.4	98.3	99.2	99.5
Minnesota		81.0	94.4	92.0	94.0	97.0	98.7	99.1
District of Columbia	70.5	76.1	78.9	71.4	86.8	95.1	98.4	98.7
Delaware	72.7	74.7	74.4	75.1	85.7	91.9	96.0	98.4
Maryland	71.3	72.0	77.7	76.4	84.3	92.8	96.2	98.7
West Virginia				73.6	85.6	91.7	95.2	98.0
Kentucky	65.5	63.4	69.0	64.3	78.3	87.9	93.4	97.9
Missouri	73.5	75.8	80.2	81.6	90.9	95.7	97.7	98.9
Virginia	52.6	54.0	56.0	49.9	69.8	84.8	91.3	97.6
North Carolina	50.5	48.1	52.8	48.3	64.3	81.5	90.0	97.2
South Carolina	36.2	37.3	39.4	42.4	55.0	74.3	85.1	96.1
Georgia	47.6	46.8	47.3	43.4	60.2	79.3	91.6	96.7
Florida	50.4	44.5	52.1	45.2	72.2	86.2	92.9	97.9
Alabama	47.0	44.3	45.4	45.8	59.0	77.1	87.4	96.7
Mississippi	42.6	42.5	39.1	46.1	60.0	77.6	86.9	96.4
Louisiana	46.5	43.3	46.7	47.5	54.2	71.0	86.5	93.2
Tennessee	60.5	58.0	61.9	59.1	73.4	86.4	92.8	97.7
Arkansas	63.0	56.7	60.5	69.8	73.3	87.4	93.2	97.5
Texas		62.4	64.3	61.2	80.3	90.1	93.2	96.4

* Sources of Data the same as those given in Table IV

j) There was little change in the literacy level in the South until after 1870. Rapid progress was made between 1870 and 1910. By 1950 the South was only slightly behind the other two sections in this feature.

CONCLUSIONS

The study reported was a statistical study of growth in school attendance and literacy in the United States over a period of 110 years, using data given in the Census. The statistical measures used are very crude and in recent years probably have little significance. The measures, however, appear to possess reasonable validity, in the light of the fact that the growth of 110 years and the sectional differences in this growth shown by the use of the measures are well established facts of history. The major value of the study is that it gives in mathematical terms and graphically a picture of these facts.

The three Sections of the United States, designated on the basis of cultural differences existing in 1860, show the same general pattern of growth in the two traits considered, though at different levels. These sectional differences had by 1950 practically disappeared.

The South of 1870 began its movement toward universal schooling with a very great handicap, even when historic-economic factors are not taken into account. This handicap it overcame, but it has taken three generations of social evolution to accomplish the task.

BIBLIOGRAPHY

1. Herman G. Richey. "Reappraisal of the State School Systems of the Pre-Civil War Period," Elementary School Journal, XLI (October 1940), pp. 118-29.
2. Herman G. Richey. "The Persistence of Educational Progress During the Civil War," Elementary School Journal, XLII (January, February 1942), pp. 358-66; 456-63.
3. Sixth Census, or Enumeration of the Inhabitants of the United States in 1840.
4. Statistical View of the United States: Compendium of the Seventh Census, 1850.
5. Seventh Census of the United States, 1850.
6. The Population of the United States in 1860: The Eighth Census.
7. A Compendium of the Ninth Census, 1870.
8. Ninth Census, Vol. I: The Statistics of the Population of the United States, 1870.
9. Ninth Census, Vol. II: The Vital Statistics of the United States, 1870.
10. Compendium of the Tenth Census, 1880.
11. Report on the Population of the United States at the Eleventh Census, Part I, 1890.
12. Report on the Population of the United States at the Eleventh Census, Part II, 1890.
13. Compendium of the Eleventh Census, Part III 1890.
14. Thirteenth Census of the United States, 1910: Abstract of the Census
15. Thirteenth Census of the United States, Vols. II and III, 1910.
16. Fourteenth Census of the United States, Population, Vol. III, 1920.
17. Fifteenth Census of the United States, Population, Vol. II, 1930.
18. Fifteenth Census of the United States, Population, Vol. III, Part I, 1930.
19. Sixteenth Census of the United States, Population, Vol. II, Part I, 1940.
20. A Report of the Seventeenth Decennial Census of the United States, Vol. II, 1950.
21. John Hope Franklin. From Slavery to Freedom (New York: Alfred A. Knopf, 1947).
22. John Hope Franklin. The Free Negro in North Carolina, 1790-1860 (Chapel Hill: University of North Carolina Press, 1943).

FOOTNOTES

1. The study was suggested by the pioneer work of Herman G. Richey, first reported in the Elementary School Journal (1, 2).
2. Census reports of 1840-1890 gave a second set of data on school attendance, a report from schools of attendance at the school during the designated period. In my study the report from individuals rather than that from schools is used. Richey used the school report.
3. Illiteracy figures for 1870, 1890, 1910, 1930 are reported by age-groups, so that it was possible to compute the percentage for the population twenty years old and over (8:252, 396; 13:310; 17:1226).
4. The comparison here is not a simple one. The estimate made by the statistician was for the population fourteen years old and over; mine is for that ten years old and over. He reports 3.2% illiterate; my figure is 2.1%.
5. Data for each state are shown in Tables V and VI for anyone interested in seeing them. Extreme differences here are of course greater than those between Sections.
6. Richey's study emphasized this fact (2).
7. In designating the three areas compared here, Rhode Island was classed as Middle Atlantic rather than New England, since it had from its origin as a colony been outside the orbit of Puritanism.
8. It should be clearly understood that this study does not show the absence of major differences among the Sections in education in 1950.

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ACHIEVEMENT ON THE STANFORD ACHIEVEMENT TEST OF CHILDREN IN DIFFICULT OWN HOME SITUATIONS COMPARED WITH CHILDREN PLACED OUT OF THE HOME

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A. Introduction

IN PREVIOUSLY reported studies of children in an institution for delinquents (2), in the foster home (3), and in the orphan home (4), similar patterns of performance were found which varied from that of the general school population upon which the Stanford Achievement Test was standardized (6). The children in these environments were known to be disturbed. Was this pattern due to an environmental situation or was it due to the fact that the children were emotionally disturbed? Can teachers look to the pattern a child establishes in his achievement test for clues to possible emotional disturbances? The polite, conforming child with pent-up fears and hostilities may be far more disturbed than children who act out their emotional problems. For this child, and for the child whose overt behavior appears to be normal and yet may not be, in the absence of any other data concerning the child, would his performance cause the teacher to think in terms of the child's possible referral to a recognized center for child study?

The present study compares the performance on the Stanford Achievement Test of one hundred thirteen persons living in their own homes, our "normal home group," persons who were referred to a family or child guidance agency because of difficulties occurring in the area of relationships among persons in their own home, with the performance of children studied previously, children who were either in a home for the socially maladjusted, foster home, or an orphan home. The maladjusted group were on the average two years three months older than the foster home and the orphan home children and a year older than the children in "normal homes." The mean age was thirteen for both sexes, the males being eight to twenty-three years inclusive, the females being nine to sixteen years inclusive. While the maladjusted group was made up entirely of males, and the foster and orphan home groups were 50 percent males, eighty-seven of the "normal home group" were males and twenty-six were females. The average grade placement for the maladjusted group was 7.7; the foster home group, 7.1; the orphan home group, 6.6. For the "normal home group" the average grade allocation was 7.0. The I.Q. range of the "normal home group" was greater than the other three. The average I.Q. of the males was 101.0, the range being 44 to 192, and of the females 99.1, the range being 65 to 162. For the "normal home group" the average I.Q. was 100.5. The "normal home group" on the average was on the same diagnostic intelligence level as the foster and orphan home groups, while the maladjusted group was on the average in the dull normal intelligence classification. The cultural background of the "normal home group" was higher than those of the other three groups. Most of the "normal home group" came from Jewish homes, having been referred for examination by the Jewish Social Service Bureau of Detroit, and a few were referred by the Catholic Family Center of Detroit. In many of the homes, however, religion was not a dominant factor. The children in the "normal home group," for the most part, had difficulties in their relationships with their parents and siblings, in many instances with the school, and in a few instances with society in general, their reactions being anti-social. All were emotionally quite immature.

B. Statistical Data

A record was kept of the grade (G) in which the child was placed at the time of the examination and the grade achieved on each of the items of the Stanford Achievement Test, e.g., Paragraph Meaning (PM), Word Meaning (WM), Reading (R), which is the mean score obtained from PM and WM, Language Usage (LU), Arithmetic Reasoning (AR), Arithmetic Computation (AC),

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Arithmetic (A), which is a mean score obtained from AR and AC, Literature (L), Social Studies I (SSI) which is loaded with questions concerning history, Social Studies II (SSII) which is loaded with questions concerning geography, Social Studies (SS) which is the mean score between SSI and SSII, Elementary Science (ES), Spelling (S), and Total (T). (Note: the initials are used exclusively in the tables presented.) The mean, standard deviation of the mean, standard error of the mean, intercorrelations among the tests, differences between the means, the standard error of the difference and critical ratios were calculated. Some comparison between data in this study and those obtained in the three previous studies were noted.

The mean achievement of the "normal home" children compared with that obtained with the maladjusted, foster, and orphan home groups is revealed in Table I. According to grade allocation the "normal home" children who were older than the foster home and the orphan home group, were slightly below in grade placement, when compared with the former group and above, when compared with the latter. This last situation, of course, could be due to the age factor. Except for Word Meaning, Social Studies I and Literature, like all the other groups studied, the grade placement was higher than that of their achievement in any other subject, the greatest difference being in Arithmetic Computation which was 1.1 below. The only time when achievement exceeded grade placement was in Literature in the orphan home group. The maladjusted group was the only group revealing on the average subnormality in intelligence, and were a year older chronologically than the "normal home" group. Age was a predominant factor in promotion in the maladjusted group.

Table I reveals that there were no significant differences among the means in the normal home group, except possibly in the difference in the means in Language Usage between this group and the foster home group. The "normal home" group appears to excel in all subjects, except that spelling was .2 of a grade below that of the foster home group. The foster home group while higher in I.Q. were one year younger than the normal home group, which may account for the general acceleration. It is important, too, to note that the highest acceleration of the normal home group over the foster home group was .6 of a grade. According to age, therefore, the "normal home group" actually achieved poorer by comparison. The acceleration of the foster home children over the general population has been pointed out by others (5).

The rank order of performance is described in Table II. With the exception of the findings of Smith and Hixon (7), Arithmetic Computation is the last in rank order for all groups studied. Those subjects which compel exactitude in thinking, again, with the exception of Smith and Hixon, appear to rank consistently lower than those which do not. For the "normal group" Spelling appears lower in rank order than in any other of the groups we have studied. There is, therefore, a similarity of performance between the "normal home" group of emotionally disturbed children and those children who are atypically placed, i.e., either in a home for pre-delinquents, orphan home, or foster home.

Table III compared the average achievement by grades on the Test as compared with the average actual school placement. While in no instance were the children in the maladjusted group and in the foster home group on the level with their grade placement, only in one instance, in Literature, were the orphan home group above in achievement when compared with their grade placement. The "normal home group" revealed acceleration in achievement on the test over grade placement in two instances, in Word Meaning and, as in the orphan home group, in Literature, and on the level with their grade placement in Social Studies I. In all other instances they were achieving below their placement level. All groups, however, revealed that the greatest difference between grade placement and achievement on the test occurred in Arithmetic Computation, -2.4 years in the maladjusted group, -1.4 years in the foster home group, -1.3 in the orphan home group, and -1.1 years in the normal home group. There was, however, less difference on the average between this subtest result and grade placement, as well as between the total results on the test and grade placement among the normal home group than among those children who were placed out of their home, the maladjusted group revealed -2 years, the foster home group -.9 of a year, the orphan home group -.8 of a year, and the normal home group -.5 of a year.

Each subject was correlated with each other and with results and grade allocation (Table IV). High correlations exist among paragraph meaning, word meaning and reading. The arithmetical items correlate highly among themselves. Social Studies I and II as well as Social Studies, also correlate highly with each other. Reading, arithmetic and social studies being respectively a total of their sub-tests would, of course, lend itself to high correlation which is also true of the total score in relation to all of the subtests. Arithmetic Computation correlated poorest with all of the other subtests, with Total and Grade Placement, with the exception of the two other math items. Language Usage correlated poorest of all, and that was with grade allocation. Grade allocation seems to correlate consistently lower than what should be expected if the children were properly placed according to achievement rather than age. There was a substantial agreement in

TABLE I

MEAN ACHIEVEMENT BY GRADES OBTAINED BY 113 "NORMAL" HOME CHILDREN, COMPARED WITH PERFORMANCE OF THE SOCIALLY MALADJUSTED GROUP, FOSTER HOME GROUP AND ORPHAN HOME GROUP ON THE STANFORD ACHIEVEMENT TEST

Subject	Maladjusted Group (2)			Foster Care Group (3)			Orphan Home Group (4)			"Normal Home" Group			Acceleration of "Normal" over Maladj.		Acceleration of "Normal" over Foster		Acceleration of "Normal" over Orphan	
	Mean	SD	M	Mean	SD	M	Mean	SD	M	Mean	SD	M		D/OD		D/OD		D/OD
PM	5.8	1.9	.06	6.2	1.7	.17	6.1	1.8	.15	6.6	2.4	.23	.8	.30	.4	.72	.5	.58
WM	6.4	2.0	.07	6.8	2.0	.20	6.4	2.0	.17	7.2	2.6	.23	.8	.30	.4	.76	.8	.36
R	6.1	2.0	.06	6.5	1.8	.18	6.3	1.9	.16	6.9	2.4	.23	.8	.30	.4	.73	.6	.47
LU	5.4	2.0	.07	6.2	2.1	.21	5.6	2.0	.17	6.3	2.2	.21	.9	.25	.1	2.97	.7	.39
AR	5.9	1.4	.05	5.9	1.6	.16	5.4	1.2	.10	6.3	1.9	.18	.4	.30	.4	84	.9	.23
AC	5.3	1.6	.05	5.7	1.5	.15	5.3	1.4	.12	5.9	1.9	.18	.6	.20	.2	1.51	.6	.36
A	5.6	1.5	.05	5.8	1.5	.15	5.4	1.3	.11	6.1	1.8	.17	.5	.39	.3	.88	.7	.26
LI	5.9	2.4	.08	6.8	2.3	.23	6.9	2.6	.22	7.1	3.0	.28	1.2	.24	.3	1.21	.2	1.56
SSI	5.8	2.3	.08	6.4	2.7	.27	6.3	2.6	.22	7.0	2.9	.27	1.2	.23	.6	.64	.7	.50
SSII	6.0	2.1	.07	6.4	2.0	.20	6.0	2.2	.19	6.9	2.7	.25	.9	.29	.5	.64	.9	.35
SS	5.9	2.1	.07	6.4	2.3	.23	6.1	2.3	.19	6.9	2.6	.23	1.0	.24	.5	.65	.8	.37
ES	5.9	2.4	.08	6.1	2.2	.22	5.7	2.1	.18	6.5	2.8	.26	.6	.45	.4	.85	.8	.40
S	5.7	1.9	.06	6.5	2.0	.20	5.7	1.7	.14	6.3	2.3	.22	.6	.34	-.2	1.49	.6	.43
T	5.7	1.7	.06	6.2	1.7	.17	5.8	1.7	.15	6.5	2.1	.20	.8	.26	.3	.07	.7	.36
G	7.7	1.2	.04	7.1	1.5	.15	6.6	1.7	.14	7.0	1.6	.15	-.7	.22	.1	2.12	.4	.51

TABLE II

A COMPARISON OF RANK ORDER OF PERFORMANCE OF ACHIEVEMENT OF GROUPS OF CHILDREN

Vera Chase (1)	Feinberg's Maladj. (2)	Feinberg's Foster Care (3)	Smith-Hixon Non-Orphans (7)	Smith-Hixon Or-phans (7)	Feinberg's Orphans (4)	Feinberg's Normals
PM	WM	WM	Geo	Geo	LI	WM
WM	Geo	LI	WM	WM	WM	L
Geo	H - C	S	LU	AC	Geo	H - C
H - C	LI	Geo	LI	PM	PM	G
LI	ES	H - C	AC	AR	H - C	PM
LU	AR	LU	AR	S	S	ES
S	PM	PM	H - C	LU	ES	LU
AR	S	ES	PM	LI	LU	AR
ES	LU	AR	ES	H - C	AR	S
AC	AC	AC	S	ES	AC	AC

TABLE III

THE DIFFERENCE OF MEANS BY GRADES OBTAINED BY THE 113 "NORMAL HOME" GROUP COMPARED WITH THE DIFFERENCES OF THE SOCIALLY MALADJUSTED GROUP, FOSTER HOME GROUP, AND ORPHAN HOME GROUP, BETWEEN ACHIEVEMENT AND GRADE PLACEMENT, AS TESTED BY THE STANFORD ACHIEVEMENT TEST

	Maladjusted Group	Foster Care Group	Orphan Home Group	Normal Home Group
	Average Grade Placement			
Subject	7.7	7.1	6.6	7.0
PM	-1.9	- .9	- .5	- .4
WM	-1.3	- .3	- .2	+ .2
R	-1.6	- .6	- .3	- .1
LU	-2.3	- .9	-1.0	- .7
AR	-1.8	-1.2	-1.2	- .7
AC	-2.4	-1.4	-1.3	-1.1
A	-2.1	-1.3	-1.2	- .9
L	-1.8	- .3	+ .3	+ .1
SSI	-1.9	- .7	- .3	0.0
SSII	-1.7	- .7	- .6	- .1
SS	-1.8	- .7	- .5	- .1
ES	-1.8	-1.0	- .9	- .5
S	-2.0	- .6	- .9	- .7
T	-2.0	- .9	- .8	- .5

TABLE IV

INTER-CORRELATION: EACH TEST WITH EVERY OTHER TEST, WITH TOTAL AND GRADE PLACEMENT ON THE BASIS OF GRADE LEVEL ACHIEVED BY THE "NORMAL" HOME CHILDREN ON THE STANFORD ACHIEVEMENT TEST

	PM	WM	R	LU	AR	AC	A	L	SSI	SSII	SS	ES	S	T
WM r	.373													
PE	.015													
R r	.960	.963												
PE	.005	.005												
LU r	.789	.800	.823											
PE	.024	.022	.021											
AR r	.651	.680	.691	.695										
PE	.037	.034	.033	.033										
AC r	.500	.524	.558	.557	.702									
PE	.048	.046	.044	.044	.032									
A r	.643	.656	.673	.674	.937	.937								
PE	.037	.036	.035	.035	.008	.008								
L r	.840	.871	.886	.740	.565	.485	.729							
PE	.019	.015	.014	.029	.043	.049	.030							
SSI r	.794	.839	.855	.735	.638	.550	.642	.821						
PE	.023	.019	.017	.029	.038	.044	.038	.021						
SSII r	.817	.710	.788	.713	.616	.525	.637	.737	.791					
PE	.021	.032	.024	.032	.039	.046	.038	.029	.024					
SS r	.857	.826	.865	.763	.665	.567	.663	.815	.949	.944				
PE	.017	.021	.016	.027	.035	.043	.036	.021	.006	.007				
ES r	.783	.761	.829	.717	.590	.458	.563	.786	.739	.795	.809			
PE	.025	.026	.020	.031	.041	.050	.043	.024	.029	.023	.022			
S r	.764	.814	.815	.742	.692	.858	.662	.727	.758	.583	.709	.609		
PE	.026	.021	.021	.029	.033	.042	.036	.030	.027	.042	.032	.040		
T r	.936	.932	.953	.872	.779	.667	.778	.889	.908	.873	.930	.856	.843	
PE	.008	.008	.006	.015	.024	.035	.025	.013	.011	.015	.008	.017	.018	
G r	.530	.631	.575	.475	.692	.525	.613	.585	.600	.535	.595	.528	.649	.662
PE	.046	.038	.043	.049	.033	.046	.040	.042	.040	.046	.041	.046	.042	.036

all relationships on the table.

Significant differences between the means and reliability is revealed in Table V. Differences are greatest between Arithmetic Computation and Word Meaning (1.27 years), Arithmetic Computation and Literature (1.24 years). The mean difference between Grade Allocation and the other subtests is greatest with Arithmetic Computation (1.02 years).

C. Some Comparative Data

The general pattern of the correlation data is reviewed in Table VI. In all four groups Arithmetic Computation has the lowest correlation with all other items, with the exception of the Arithmetic items. In all groups, though, Grade Allocation reveals consistently lower correlation with scores in achievement.

Since we are interested in the variation in achievement among the test items, we noted in Table VII those relationships which are significantly different from the normal relationships. In these studies, 105 relationships or differences in performance is obtained.

For the maladjusted group there were more variations above two sigmas than below. Since these boys were not as intelligent as those of the other groups and were older, the grade factor seemed to be the most important. Most significant was the relationship between grade and arithmetic computation in which the greatest variation was revealed. For the foster home group most of the variations were one sigma above normal, but here, too, grade was an important variation in its relationship to many of the subjects studied. Most important, again, was the variation of Grade and Arithmetic Computation, the incidence of variation of the last with other subjects was predominant. In the more homogeneous performance on the orphan home group, Literature appeared to have the greatest variation in its relationship to other sub-tests than any other subject, and where Arithmetic Computation was concerned, the variation was among the greatest, two sigmas above normal. The least variation appeared in the "normal" group, but Literature and Arithmetic Computation, the most deviating from normal appear in the highest deviation bracket.

D. Illustrative Material

Although more children performed more poorly in arithmetic computation than in any other subtest, there were some who performed significantly better in math than they did in other subjects. The significance, of course, lies in the variation of performance. Again, the individual whose interests are at variance with his achievement and actual ability presents another situation where math is a factor suggesting emotional difficulty.

For example, M, a young man of 17, was referred by a school system for psychological evaluation. M's father stated that M appeared to be an average student until two years ago. At that time a group of boys included M on a visit to a girl who admitted all, except M, to have had sexual relations with her. She refused him. The father dated the school failures of M since that time. M has revealed little interest in anything although he repeated that he wants to "do good work."

M appears to be a tight-lipped boy, who never smiles. Appointments to the office were made for him by his father. The mother was never mentioned by either father or son.

Although no achievement test was given to M, tests that were administered were quite significant. On the Wechsler Bellevue Intelligence Scale (Form I), he recited 9 digits forward and 8 in reverse, as M stated, "with ease." Out of possibly 14, he scored 13 points on the Arithmetic Reasoning subtest. The quotients obtained for the Verbal was 125, for the performance 121, and in total he was diagnosed as having superior general intelligence. This superiority was further verified by the 99 percentile he obtained on the Ohio State University Psychological Test when his performance was scored according to his 11th grade school placement. The variation in this situation occurs when on the Kuder Preference Record he reveals the following score:

Persuasive	84
Clerical	70
Scientific	63
Artistic	63
Mechanical	55
Musical	55
Outdoors	30
Social Service	28
Computational	5

Similarly he did not show much interest in math on the Occupational Interest Inventory. Of the three types of interest his Verbal Interest was on the 80 percentile level, his Computational Interest was on the 20 percentile level, and his Manipulative Interest was on the 20 percentile level. The Level of Interest was exceedingly low, on the one percentile level. Two discrepancies, hence, appear in his personality. First, he reveals that one of his best abilities is in the math area, and, at the same time, that is the area in which he has the least interest. Second, while he appears to have superior general intelligence, he expects to achieve or to succeed in his life work on the lowest possible level. There is a wide difference between what his actual abilities are and the level on which he expects to put

TABLE V

DIFFERENCE BETWEEN THE MEAN GRADE ACHIEVED BY THE "NORMAL" HOME CHILDREN AMONG THE ITEMS TESTED BY THE STANFORD ACHIEVEMENT TEST AND THEIR ACTUAL GRADE PLACEMENT

	PM	WM	R	LU	AR	AC	A	L	SSI	SSII	SS	ES	S	T
WM M_1-M_2	.66													
D	.116													
CR	5.606													
R M_1-M_2	.27	.30												
D	.065	.063												
CR	5.631	4.623												
LU M_1-M_2	.23	.90	.60											
D	.114	.140	.132											
CR	2.053	6.393	4.545											
AR M_1-M_2	.27	.93	.64	.04										
D	.177	.170	.168	.145										
CR	1.525	5.476	3.786	.248										
AC M_1-M_2	.61	1.27	.97	.37	.34									
D	.210	.204	.198	.185	.139									
CR	2.895	6.221	4.919	2.022	2.431									
A M_1-M_2	.44	1.10	.81	.21	.17	.17								
D	.178	.174	.171	.158	.062	.062								
CR	2.471	6.328	4.713	1.204	2.742	2.710								
L M_1-M_2	.63	.03	.27	.88	.90	1.24	1.07							
D	.153	.138	.131	.188	.232	.249	.195							
CR	4.137	.203	2.038	4.612	3.892	4.984	5.503							
SSI M_1-M_2	.44	.22	.07	.67	.71	1.05	.88	.19						
D	.164	.147	.140	.183	.208	.228	.207	.165						
CR	2.663	1.503	.529	3.663	3.413	4.597	4.251	1.170						
SSII M_1-M_2	.33	.32	.04	.56	.60	.93	.77	.31	.12					
D	.146	.184	.157	.178	.199	.216	.196	.194	.169					
CR	2.226	1.717	.261	3.140	2.990	4.597	3.903	1.588	.680					
SS M_1-M_2	.40	.27	.03	.63	.67	1.00	.84	.24	.05	.07				
D	.123	.136	.120	.153	.174	.196	.173	.162	.089	.083				
CR	3.111	1.956	.242	4.111	3.822	5.117	4.827	1.469	.506	.843				
ES M_1-M_2	.02	.68	.39	.21	.25	.59	.42	.65	.46	.35	.42			
D	.164	.172	.146	.183	.212	.239	.216	.178	.192	.164	.154			
CR	.122	3.959	2.644	1.169	1.169	2.460	1.944	3.669	2.396	2.134	2.694			
S M_1-M_2	.29	.95	.66	.06	.02	.32	.15	.93	.73	.62	.69	.27		
D	.155	.134	.137	.155	.161	.186	.167	.193	.177	.216	.172	.215		
CR	1.890	7.119	4.810	.381	.142	1.792	.880	4.798	4.141	2.861	4.000	1.270		
T M_1-M_2	.03	.68	.38	.22	.25	.59	.42	.65	.46	.34	.41	.002	.28	
D	.082	.085	.072	.105	.127	.156	.126	.137	.122	.123	.086	.136	.119	
CR	.220	7.988	5.333	2.057	1.984	3.782	3.349	4.752	3.754	2.789	4.802	.015	2.311	
G M_1-M_2	.41	.25	.05	.65	.68	1.02	.85	.22	.03	.09	.02	.43	.71	.43
D	.197	.178	.189	.194	.132	.163	.142	.228	.216	.212	.185	.221	.168	.151
CR	2.101	1.388	.254	3.340	5.182	5.270	6.014	.961	.131	.420	.103	1.964	4.208	2.861

TABLE VI

COMPARISON IN INTER-TEST CORRELATIONS AMONG THE MALADJUSTED, FOSTER HOME, ORPHAN HOME AND "NORMAL" HOME GROUPS

	PM				WM				R				LU				AR				AC			
	M*	F	O	N	M	F	O	N	M	F	O	N	M	F	O	N	M	F	O	N	M	F	O	N
PM					.88	.77	.87	.87	.97	.97	.98	.96	.63	.71	.76	.79	.56	.70	.76	.65	.54	.64	.74	.50
WM	.88	.77	.87	.87					.97	.97	.98	.96	.67	.76	.73	.80	.50	.69	.78	.68	.43	.62	.64	.52
R	.97	.97	.98	.96	.97	.96	.98	.96					.71	.79	.73	.82	.60	.70	.81	.69	.52	.63	.73	.56
LU	.63	.71	.76	.79	.67	.76	.73	.80	.71	.79	.73	.82					.51	.45	.68	.70	.44	.56	.58	.56
AR	.56	.70	.76	.65	.50	.69	.78	.68	.60	.70	.81	.69	.51	.45	.68	.70					.72	.78	.79	.70
AC	.54	.64	.74	.50	.43	.62	.64	.52	.52	.63	.73	.56	.44	.56	.58	.56	.72	.78	.79	.70				
A	.66	.69	.77	.64	.53	.68	.75	.66	.61	.71	.87	.67	.51	.59	.64	.67	.90	.93	.86	.94	.95	.94	.71	.94
L	.74	.67	.67	.84	.73	.69	.75	.87	.77	.70	.81	.89	.57	.63	.65	.74	.47	.62	.66	.57	.45	.61	.62	.49
SSI	.72	.69	.72	.79	.71	.82	.73	.84	.72	.72	.73	.86	.57	.60	.65	.74	.55	.70	.63	.64	.52	.63	.69	.55
SSII	.76	.68	.69	.82	.74	.73	.71	.71	.75	.68	.73	.79	.59	.63	.62	.71	.57	.67	.68	.62	.56	.57	.64	.53
SS	.76	.71	.77	.86	.75	.73	.77	.83	.81	.75	.75	.87	.59	.64	.67	.76	.58	.77	.66	.67	.55	.64	.62	.57
ES	.78	.72	.67	.78	.78	.78	.72	.76	.80	.79	.72	.76	.62	.67	.61	.72	.55	.70	.64	.59	.49	.65	.60	.46
S	.75	.79	.76	.76	.73	.86	.79	.81	.77	.88	.66	.82	.60	.69	.67	.74	.55	.68	.70	.69	.55	.60	.62	.59
T	.94	.87	.88	.94	.94	.88	.88	.93	.94	.94	.82	.95	.77	.81	.80	.87	.76	.83	.84	.78	.68	.77	.78	.67
G	.56	.56	.64	.53	.61	.65	.61	.63	.69	.63	.55	.58	.49	.50	.48	.48	.42	.65	.68	.69	.50	.62	.64	.53

	A				L				SSI				SSII				SS				ES			
	M	F	O	N	M	F	O	N	M	F	O	N	M	F	O	N	M	F	O	N	M	F	O	N
PM	.66	.69	.77	.64	.74	.67	.67	.84	.72	.69	.72	.79	.76	.68	.69	.82	.76	.71	.77	.86	.78	.72	.67	.78
WM	.53	.68	.75	.66	.73	.69	.75	.87	.71	.82	.73	.84	.74	.73	.71	.71	.75	.73	.77	.83	.78	.78	.72	.76
R	.61	.71	.87	.67	.77	.70	.81	.89	.72	.72	.73	.86	.75	.68	.73	.79	.81	.75	.75	.87	.80	.79	.72	.76
LU	.51	.59	.64	.67	.57	.63	.65	.74	.57	.60	.65	.74	.59	.63	.62	.71	.59	.64	.67	.76	.62	.67	.61	.72
AR	.90	.93	.86	.94	.47	.62	.66	.57	.55	.70	.63	.64	.57	.67	.68	.62	.58	.77	.66	.67	.55	.70	.64	.59
AC	.95	.94	.71	.94	.45	.61	.62	.49	.52	.63	.59	.55	.56	.57	.64	.53	.55	.64	.62	.57	.49	.65	.60	.46
A					.50	.66	.61	.73	.56	.71	.60	.64	.54	.65	.68	.64	.63	.65	.70	.66	.54	.72	.62	.56
L	.50	.66	.61	.73					.67	.71	.72	.82	.70	.76	.69	.74	.69	.75	.75	.82	.67	.68	.61	.79
SSI	.56	.71	.60	.64	.67	.71	.72	.82					.71	.81	.76	.79	.71	.81	.76	.79	.68	.68	.63	.74
SSII	.54	.65	.68	.64	.70	.76	.69	.74	.71	.81	.76	.79					.90	.93	.91	.94	.75	.67	.69	.80
SS	.63	.65	.70	.66	.69	.75	.75	.82	.90	.96	.93	.95	.90	.93	.91	.94					.74	.88	.70	.81
ES	.54	.72	.62	.56	.67	.68	.61	.79	.68	.68	.63	.74	.75	.67	.69	.80	.74	.88	.70	.81				
S	.58	.65	.68	.66	.60	.67	.63	.73	.62	.62	.51	.76	.57	.61	.58	.58	.63	.61	.66	.71	.62	.70	.61	.61
T	.77	.84	.82	.78	.82	.81	.76	.89	.82	.85	.83	.91	.84	.85	.84	.87	.87	.87	.89	.93	.85	.88	.76	.86
G	.58	.67	.58	.61	.53	.63	.47	.59	.54	.62	.55	.60	.55	.55	.48	.54	.54	.64	.51	.60	.58	.61	.49	.53

*M = Maladjusted Group; F = Foster Home Group; O = Orphan Home Group; N = "Normal" Home Group

TABLE VII

COMPARING THE MALADJUSTED GROUP (N = 872), FOSTER HOME GROUP (N = 100), ORPHAN HOME GROUP (N = 138) WITH THE "NORMAL HOME" GROUP (N = 113) ON THE BASIS OF DIFFERENCES IN PERFORMANCE (M_1-M_2) IN TERMS OF DEVIATIONS BEYOND NORMALCY

No. Relationships Compared: 105	SD .561 SEM .05 Maladjusted	SD .308 SEM .03 Foster	SD .369 SEM .036 Orphan	SD .317 SEM .03 "Normal"
Differences 1 sigma above	WM and AC	AR-WM AC-R L-AR S-AC PM-G ES-G T-G WM-A	WM-AR WM-AC WM-A AC-R A-R AC-SSI SSII-L T-L LU-G AC-G A-G L-ES S-L AR-G	LU-WM AR-WM A-WM A-R L-LU L-AR L-A SSI-AC SSII-A SS-AC SS-A S-WM S-L AC-G A-C
Differences 2 sigmas	WM-G R-G SSII-G	WM-AC L-AC AR-G A-G	L-LU L-AR L-AC L-A	AC-WM AC-R AC-L
Differences 3 sigmas above	G-PM G-LU G-A G-L G-SSI G-SS G-S G-T	G-AC		
Differences 3 sigmas	G-AC			

them to use.

The Rorschach, Blackie Pictures, the TAT and Szondi tests were administered. M's thinking revealed that he was in touch with reality and was able to conform to the mandates of society, but it was stereotyped. His range was very low. Emotionally, he was quite depressed. He was sexually disturbed, and castration-fear and sex-guilt were manifest. He reacted to the tests much like one would expect of obsessive-compulsive neurotics. The tests of Projective Technique revealed, as did the Occupational Interest Inventory above, feelings of lack of self-worth and inadequacy. It was for this reason that he was referred to a family service agency for psychotherapy.

A. B., 13 years old, was referred to the agency after having had contact periodically for several years with two other agencies. He had had considerable behavioral difficulty at school, to the point of possible expulsion. He seemed to have particular difficulty getting along with other children and created continual disturbance in the classroom situation. He was helped to remain at school but when he was 11 years old his father died and this precipitated further disturbance and fearfulness.

The mother reported that A. B. reacted very strongly to the death of his father, accusing her of the latter's death, being extremely fearful of the dark and of dying, and insisting on sleeping with her for a considerable period of time. The relationship between mother and sone became very close and there were evidences that the mother was provocative with the boy, which of course, created considerable guilt and anxiety on the part of the boy. A. B. handled his feelings of guilt and anxiety by yelling and swearing at her, and by belittling her. Her defense against this was to react hysterically, threatening to leave, to send him away, to commit suicide. This produced further guilt and A. B. would apologize, beg forgiveness and the situation would be relatively calm for another short period.

A. B. was extremely fearful of coming to the agency because of what other children would think. He was fearful that they might find out he did not have a father or that his mother's income was limited. Concessions had to be made for A. B. in terms of coming in the side entrance because he was fearful of being seen by anyone whom he knew and especially anyone from his own class at school.

In interviews, A. B. was quite hyperactive both physically and verbally. He would not remain in one spot for more than one minute, continually getting up from the chair, moving from one part of the office to another, throwing up his hands and making many and varied facial contortions. He seemed to indicate a need for a close relationship but was extremely fearful that he would be criticized for something he might do. He made a numbered list of all his fears and problems and expected these to be cleared up one by one, very quickly. The fear which concerned A. B. most was that at some point he would not be able to control himself when he got angry.

While it was felt that A. B. had quite high intelligence, he was doing barely average work at school and there were indications that he was going to fail in Math. It was partially for this reason that he was referred for psychological testing.

A. B. was examined on the Wechsler Bellevue Intelligence Scale when he was 13 years one month old and revealed a V. Q. of 117, a P.Q. of 104, and an I. Q. of 112. Subtest scores were:

Information	14
Comprehension	11
Digit Span	7
Arithmetic	9
Similarities	11
Vocabulary	11
Picture Arrangement	12
Picture Completion	7
Block Design	7
Object Assembly	10
Digit Symbol	11

The Arithmetic subtest was average here.

The Rorschach revealed a boy who was emotionally immature, and whose thinking was autistic. He had a great deal of sexual anxiety and was quite fearful in making relationships. Not only was he impulsive, but he used compulsion as a mechanism. His thinking was stereotyped. The F+% was .65. Present was a great deal of overstriving. W:M was 12:3. See Response Summary at top of next page.

If these examinations and if a report of the social worker were not available, the question is, would a teacher suspect possible emotional difficulty by scanning the achievement test? The results on the New Stanford Achievement Test (Advanced Battery Form D) were as follows:

Paragraph Meaning	12.9
Word Meaning	12.9
Reading	12.9
Language Usage	7.8
Arithmetic Reasoning	7.4
Arithmetic Computation	8.3
Arithmetic	7.8
Literature	14.0
Social Studies I	14.9
Social Studies II	12.6
Social Studies	13.6
Elementary Science	11.0
Spelling	13.0
Total (Average)	12.0

Response Summary (Hertz's Codification)

R total 34

W	12 (WO-2; W -2)	M	3 (M -1)	Animal	19	A %	62
D	21 (DO-1; D -7)	FM	5 (-2)	Animal Detail	2	H %	12
Dr	1	CHF	1 (-1)	Human	3	Anat %	6
	40	F +	7	Human Detail	1	Obj %	20
		FP	5	Anatomy	2		100%
		F -	6	Animal Object	2		
		F(C)	1 (-1)	Clouds	1		
		Fc	2	Apparel	1		
		FC	3 (-1)	Map	3		
		CF	1 (-1)				

Org. 8
Ap W! D! (dr) Exp 3/2.5 T/First R 8.4"
Seq: Orderly

One can see by scanning the subtest results that there was a depression in the area of arithmetic. If we wish to treat the results statistically we find that the average grade achieved by just using the subtests was 11.5 with a S.D. of + 2.7. Social Studies I appeared to be not quite one sigma above the average, while Language Usage, Arithmetic Reasoning and Arithmetic Computation were more than one sigma below the average. The depression in the arithmetic area was significant when compared with the results obtained on the other subtests except Language Usage. Exactitude in thinking, logical thinking, was difficult. A.B.'s performance on the Stanford Achievement Test was typical of those of other disturbed children, one could begin to suspect possible emotional disorder.

F. J. was referred to the agency by the boy's counsellor and visiting teacher at one of the Intermediate Schools because of a behavior difficulty which he was presenting at school, at home, and in the neighborhood. He was having trouble getting along with other students, was a disturbing influence in the classroom situation, and in general was not functioning up to par in school. He seemed to have a particular need to impress people, especially children his own age. At the time of referral the parents were very much concerned about the boy's gambling and losing a good deal of money which he attempted to pay back by taking money which his parents had put aside for him.

F. J. was born in Nazi Germany. During the first two years of F. J.'s life, the parents were constantly in fear of being taken by the Nazis and in fear that F. J. would say something which might hasten this eventuality. Consequently, he had to be kept quiet. At the age of two, he and his parents were placed in a concentration camp and this fear continued during their incarceration for the ensuing three years. Following this, they spent 2 years in a D. P. camp in Switzerland after which they came to the United States. F. J. was eight years old when he started public school and was placed in a grade on the level with American children of his age. He passed with difficulty all grades up to the 7-B which he failed.

A further complication was that the mother had trouble in accepting any independence on the boy's part. She put rather extreme emphasis on the boy's accomplishment in school. It was not easy for the father to accept "the American way" of bringing up children, and tended to be overly strict with the boy. In essence, then, the series of adjustments which this boy had to make caused a confused situation resulting in extreme difficulty in functioning scholastically while he attempted to adapt himself to rules set up by adults, his parents, and children of his own age group.

Examination of F. J. on the Wechsler Bellevue Intelligence Scale when he was 14 years 9 months reveals a verbal quotient of 93, a performance quotient of 86, and an intelligence quotient of 88. Although this resembles dull normality, the general uneveness of his performance on this test revealed that we were testing intelligence mixed with extreme emotional disturbance. The subtest scores were:

Information	10
Comprehension	6
Digit Span	7
Arithmetic	10
Similarities	8
Vocabulary	7
Picture Arrangement	7
Picture Completion	3
Block Design	11
Object Assembly	11
Digit Symbol	8

It appears he had normal ability in arithmetic. However, he was quite panicky during the examination and feared failure. His judgment was quite poor, but even in his replies there was a feeling that it was not on the basis of subnormality, but on the basis of emotional disturbance resulting in misinterpretations that caused "poor" replies. For example, when he was asked "Why should people pay taxes?", he replied "I don't know. That's what I want to ask you about. What's the use of people giving the government money? They'll get it back anyway." He would keep away from bad company because "you don't know what they are like, what they will do."

He gave only eight responses to the Rorschach, rejecting Cards VI, IX and X. He revealed free-floating anxiety, autistic thinking, and feelings of inferiority. There was some reference to blackness. The Blackie Pictures, the TAT, and the Drawing of a Person, as well as the Szondi all revealed sex guilt, castration fear, antagonism to people. He could not volunteer the use of color. His relationship with people and to authority were poor. He was highly constricted. He was quite frightened and depressed. There was much fantasy and he was not at all practical. F. J. rejected Picture XIII on the TAT, revealing sex shock.

The New Stanford Achievement Test (Advanced Battery Form F) reveals the following grade achievements:

Paragraph Meaning	4.6
Word Meaning	7.4
Reading	6.6
Language Usage	5.4
Arithmetic Reasoning	9.6
Arithmetic Computation	11.0
Arithmetic	10.3
Literature	5.1
Social Studies I	4.6
Social Studies II	4.2
Social Studies	4.4
Elementary Science	3.8
Spelling	8.5
Results	5.9

F. J. presents another type of deviation from the norm in the area of arithmetic and especially in arithmetic computation. The average results on the subtests were 6.4 grade with a S. D. of 2.4, so that grade achievements below 4.0 and above 8.8 were significant. Significant was his performance by one sigma in arithmetic reasoning and almost by two sigmas in arithmetic computation. F. J. found it difficult to deal with any subject except the most concrete. Here, again, the teacher might suspect emotional disorder if no previous knowledge about F. J. was available. This situation is not as common among disturbed children as was the situation of A. B. Nevertheless, the deviation is present to the extent that it would enable one who was aware of the subtest scores on the achievement test to recommend F. J. for careful study.

Summary

1. The children in the "normal home" group achieved better than the children in either the maladjusted, foster, or orphan home groups although they had approximately the same intelligence as the foster and orphan home groups, and above that of the maladjusted group.

2. The actual achievement of children in the "normal home" group when age and intelligence factors were considered was not as good as those of the orphan and foster home group and above that of the maladjusted group.

3. There was a substantial agreement among all subjects when each test was correlated with each subtest for the "normal home" group.

4. The children in the "normal home" group who were referred because they were under some kind of emotional stress did not perform too significantly different from those who were placed out of the home, either in institutions for delinquent boys, in foster homes or in orphan homes. On the average they revealed significant variations from their own individual averages in the areas of arithmetic, and particularly in arithmetic computation. This is true whether the arithmetic computation score may be significantly below their general average, or significantly above their general average.

5. The emotional condition rather than the environmental factor, or even general intelligence of the child, is the significant factor in determining the performance of a child on the achievement test. If the arithmetic score is significantly depressed, as it is in most instances of disturbed children, or if it is significantly above the child's results on the other subtests of the achievement test, we may suspect emotional difficulty of sufficient extent to consider the child's referral for psychiatric or casework study.

6. One may suspect the need for referring a child for social and personality study when the child's interests, ability and achievement are at variance in the arithmetic area. That is, if a child's interest is predominantly in fields other than arithmetic, in which subject he may reveal superior ability, we may suspect a lack of realistic self-planning, and hence, a need for guidance.

7. The child whose scores in arithmetic are depressed may have difficulty in getting himself to think in fields requiring exactitude in thinking. The child who can only think in terms of "one and one is two" fears to think in fields other than the most concrete.

8. While children who are emotionally disturbed will not achieve on the level with their grade placement and will reveal a definite variation in performance in Arithmetic Computation as compared with their performance on the other subtests of the Stanford Achievement Test, this study also suggests (Table III) that children placed out of the home will not achieve on the level with their grade placement as closely as children living in their own homes, despite the fact that these children are emotionally disturbed. This may suggest that placement out of the home may increase the emotional trauma. This further suggests that children should properly be kept in their own homes. Any change in a child's environment, especially his "own home environment" should be made only after a recognized social agency has recommended placement after all communal resources have been used.

REFERENCES

1. Chase, V. "Educational Achievement of Delinquent Boys," Journal of Juvenile Research, XVI (1932), pp. 189-92.

2. Feinberg, H. "Achievement of a Group of Socially Maladjusted Boys as Revealed by the Stanford Achievement Test," Journal of Social Psychology, XXVI (1947), pp. 203-12.

3. Feinberg, H. "Achievement of a Group of Children in Foster Homes as Revealed by the Stanford Achievement Test," Journal of Genetic Psychology, LXXV (1949), pp. 293-303.

4. Feinberg, H. "Achievement of Children in Orphan Homes as Revealed by the Stanford Achievement Test," Journal of Genetic Psychology, LXXXV (1954), pp. 217-29.

5. Freeman, F. N., and others. The Influence of Environment on the Intelligence, School Achievement, and Conduct of Foster Children, 27th Yearbook of the National Society for the Study of Education (Bloomington, Ill: Public School Publishing Co., 1928), pp. 102-217.

6. Kelley, T. L., and others. New Standard Achievement Test (New York: World Book Co., 1929).

7. Smith, H. P. and Hixon, L. A. A Comparative Study of Orphanage and Non-Orphanage Children, Elementary School Journal, XXXVI (1935), pp. 110-115.

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STUDIES OF TEACHER BEHAVIOR

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THIS REPORT summarizes the major studies of the Harvard Teacher Education Research Project. In 1953, preliminary plans for the project were outlined by one of the writers (6).

Some remarks may be made here about the history of the project and a review of its "philosophy". The project was begun in 1952 when a committee of the faculty of the Harvard Graduate School of Education met regularly to discuss research approaches for evaluating the "fifth year" programs at the School.[1]* The committee decided not only to investigate the results of this institution's training but also to study more general aspects of teacher behavior. Therefore, researches were started that involved not only the student-teachers but also experienced, practicing teachers.

One of our objectives has been to predict attitudes and behavior at a given point in the teacher's career from a knowledge of her attitudes and behavior at a preceding time. For instance, we have studied the relationships between a pre-graduate school group of variables (undergraduate major, childhood residence, etc.,) and initial graduate school variables (interest in teaching, attitudes toward children, etc.); then between graduate school experiences and characteristics of the first year of full-time teaching (obtained from a follow-up questionnaire), etc. Also, we have been interested in studying teachers at a given time in their careers, e.g., the relationships between certain teacher behaviors in the classroom and the performance of the pupils in that classroom.

Our general philosophy has been that in such step-wise fashion we could achieve useful insights into the antecedents of given kinds of teacher behavior in the classroom and their consequences. To say that a teacher should be warm and friendly toward pupils gains added importance when it is demonstrated that such teacher behavior has particular kinds of effects on the performance of the students in his classroom. Likewise, it is useful to select teachers by means of an attitude scale only if it is known that such attitudes are related to classroom teaching behavior, and, in turn, to pupil performance.

Before the studies here reported could be carried out, substantial effort was spent on developing measuring instruments. In this phase, research involving experienced teachers as well as teacher trainees was undertaken. The feasibility of rating teacher behavior by means of student reports was developed and the relationships of such beliefs to classroom behavior explored. A variety of devices to obtain relevant information from incoming and resident teacher training students was devised and tried. Among these were questionnaires and tests to measure personal involvement in education as a career, which turned out to be of first importance in predicting later withdrawal from teaching. Also, an efficient questionnaire for obtaining a variety of information about the graduate's teaching experiences and future plans was successfully used.

We were intrigued to find that investigating one area of educational importance—the evaluation of teaching effectiveness—had ramifications for other educational problems. For example, in order to test one of our hypotheses, we first had to perform an experiment on teaching methods, which provided important information about methods for teaching problem solving.

Though we are optimistic about the value of

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** The participants in the Project have been Walter J. Ackerman, Morris L. Cogan, Thomas L. Hilton (Director, 1955-56), Gloria F. Leiderman (Associate Director), Harry Levin (Director, 1952-55), Dean W. Seibel, and William A. Stuart.

* All footnotes will be found at end of article.

our results, it is the tradition of science to be cautious. Many of the instruments could profit from further experimentation. The current findings permit more efficient future studies because we can now pursue definite variables which are known to be relevant. In general, we feel that many of the studies to be reported could profitably be repeated so that we can be more confident of their trustworthiness.

Study I: The Relation of the Behavior of Teachers to the Productive Behavior of their Pupils[2]

For years we have heard that it is of prime importance for a teacher to be warm and friendly toward students; and yet there is little objective evidence that warmth and friendliness have demonstrable effects on pupil behavior (1). This study by Dr. Morris L. Cogan investigated the relationship between such teacher behaviors and the amounts of both required and class-related self-initiated work performed by their pupils.

On the basis of a so-called Pupil Survey which was administered to 987 junior high-school pupils, the teachers of these pupils were scored on three scales. The first is a measure of the extent to which the teacher's behavior is warm and friendly. The second scale measures dominative, aggressive, and rejectant behavior. The third provides a measure of the extent to which the teacher exhibits certain technical competences such as skillful classroom management, command of subject matter and creativeness in dealing with it. Also, measures of both the amount of required work and the amount of self-initiated work undertaken by each pupil was obtained from the pupils and their teachers.

These data were analyzed in two ways. The first was an individual-difference analysis in which each of the 33 classrooms was considered separately. In almost every classroom, significant relationships were found between the extent to which the student described the teacher as warm and friendly and the amount of both self-initiated and required work. A validation check on the pupils' report indicated that the pupils tended to report as the teachers saw them.

The second type of analysis was a direct test of the relationship between teacher behavior as reported by the pupils and the amount of self-initiated and required work. In this analysis, which is the more important one for purposes of evaluating teacher competence, the arithmetic means for each class were used so that each teacher provided one score in the analysis. Here, too, results show very clearly that the more friendly and warm the teachers are, the more self-initiated and required work their pupils do. No relationships were found between the rejectant scale and either self-initiated or required work. The most likely explanation for the lack of findings is that the children could not agree about how rejectant the teacher was, even though they could agree about how friendly he was. One way of interpreting these findings is in terms of "identification". We can think of self-initiated work as being an index of similarity of values between the pupil and the teacher. The pupil who does a large amount of self-initiated work has accepted these values as his own since the major instigation for self-initiated work comes from the pupil himself rather than from direction by the teacher. In other studies the friendly, affiliative nature of the relationship between the adult and child have been requisite to identification (7).

Another interpretation of these data, one that Dr. Cogan uses, is that the child, by doing work, brings himself into symbolic proximity to the teacher and if this is found to be a pleasant relationship, the child tries to recreate it by doing things that the teacher would like or that the teacher stands for.

A further interpretation is that the amount of self-initiated work the pupil does is an index of the pupil's interest in the subject. We would conclude from the findings that the characteristics of the teacher-child relationship influence interest in the subject.

Without any preference as to which explanation is the most useful one, we can say that there is a substantial relationship between the teacher's friendliness and certain kinds of work done by the children. For purposes of teacher selection, this finding is useful if, indeed, the interest or motivation of the student in the subject is a preferred outcome of the teacher's work with the children, as it usually is. It may well be that for other pupil outcomes—learning of factual content, for example—other kinds of teacher behavior are more effective. This introduces again the problem of choosing the criteria for evaluation of the teacher and recognizing that in estimating teacher competence the antecedents of one criterion may be quite different from those of another.

Cogan's study indicates that useful measures of teacher behavior can be obtained from pupils. It must be emphasized that the judgments were based on very specific behaviors which the students were able to observe in their day-to-day experiences with the teacher. We suspect that if he had asked for more general or more inferential judgments from the pupils, as useful information would not have been obtained.

Study II: The Prediction of Classroom Behavior of Student Teachers[3]

Working with experienced teachers, Cogan in the study summarized above found that teachers who are regarded by their pupils as friendly, warm, and accepting achieve certain teaching

outcomes. Seibel asked the question: "Which teachers are likely to behave in the classroom in a warm, affiliative way?" and "Can we predict this behavior from information obtained from the teachers earlier in their careers?" Thus, although Seibel's work was planned and executed as an independent effort, it can be thought of either as a significant background for, or as a logical continuation of, Cogan's work.

The subjects for Seibel's study were 100 student-teachers at the Harvard Graduate School of Education from whom the Project had obtained a large pool of antecedent measures, i.e., measures obtained prior to their practice-teaching which might serve as predictors of their performance in practice teaching.

Eight classroom teacher actions, each of which seemed to be an important aspect of what might be called emotionally-warm teacher behavior were selected for study. These actions were: (1) the use of praise and rewards, (2) the offering of encouragement and support, (3) affectionate physical contact with pupils, (4) movement about the classroom, (5) non-instructional service to pupils, (6) compliance with suggestions made by pupils, (7) solicitation of suggestions, and (8) the use of humor.

Ratings of the extent to which each student-teacher engaged in these different actions were obtained from three sources: (1) the critic teachers who supervised the apprentice teaching of the student-teachers; (2) teaching fellows on the staff of the School of Education who periodically observed the teaching of the student-teachers; and (3) the student-teachers themselves. The teaching fellows were trained in the use of the eight rating scales, which included precise descriptions of each point on each scale. The extent to which the student-teacher had freedom to exhibit the action in question was also rated. It was important to have this latter information in order to correct for the fact that many of the student-teachers were teaching in situations where they were unable to exhibit the action freely.

From the pool of available predictor measures, twelve were selected, including several attitude scales, personality measures, and a measure of scholastic aptitude. The major analysis of these measures consisted of ascertaining the best combination of predictors and simultaneously the best combination of the eight rated classroom actions. In other words, the question asked of the data was: If we want the highest possible correlation between the predictors and the criteria, which predictors and which criteria should we use and how much should each score be weighted? The statistical technique used was a canonical correlational analysis. The analysis was done separately for supervisors' ratings and for the student-teachers' self-ratings. For supervisors' scores, the ratings made by the critic teachers and the teaching fellows were combined.

Considering only the self-ratings, the most predictable classroom actions were, first, the amount of physical contact the student-teacher has with the student, and second, the amount of her movement about the classroom. A third factor, which contributes substantially less than either of the first two, is the amount of support which the teacher gives the child. The fourth is the amount of rewards used by the student-teacher.

To predict these criteria, it was found that the scores on the Miller Analogies Test (MAT, a measure of the scholastic aptitude) should be weighted negatively. In other words, to get the most accurate prediction of what might be called "emotionally warm" teaching, each subject's MAT score should be subtracted from the sum of his scores on the other predictors. Consequently, you would predict that subjects with high MAT scores would receive lower ratings in emotional warmth, other things being equal. Second, the Minnesota Teacher Attitude Inventory (MTAI) scores show a positive relationship to the above teaching actions.

More important than these scores, however, was the change in the MTAI scores between its administration at the beginning of the academic year at the School of Education and at the end of the year. If the change is in the direction of more permissive attitudes toward children, the student-teachers are more likely to show more physical contact, more movement about the classroom, provide more support, give more reward, etc.

Another good predictor was found to be a score derived from the so-called Wickman Schedule (9), namely, the number of different kinds of problem behavior which the student-teachers regarded as of little or no consequence when shown by a child. This may be interpreted as a lack of over-concern with problem behaviors, or a willingness to accept problem behaviors that the child shows as a normal part of the child's development.

For lack of a better expression, let us say that the consequent measures which we have described constitute a measure of rapport with children. Judging from our findings, we can propose that rapport is predictable from the extent to which permissive attitudes toward children increase during the fifth-year program. The prediction is improved by considering low rather than high scholastic aptitude, as well as what we might regard as a tolerance of broad ranges of behavior as normal in the child. The results were comparable for the supervisor ratings, though the weights assigned to particular variables differed from self-ratings. In other

words, in order to predict rapport as seen by the supervisor we must treat the predictors differently than when our purpose is to predict self-estimates of rapport. This point will be discussed again below.

An obvious conclusion, but one that should not be taken lightly, is that warm and supportive classroom teacher behavior is, indeed, predictable from a series of antecedent measures. Although there is no guarantee that it would be so, we would expect to find that approximately the same relationships exist within similar samples of student-teachers. It should be cautioned, however, that this statistical technique is very sensitive to even minor changes in the nature of the sample.

The extent of the relationships obtained in this study is not sufficiently high that we would unconditionally recommend the use of the predictor instruments in selection of teacher candidates. The primary value of this study is that it points to certain variables which would be useful to explore further.

The supervising teaching fellows made judgments about whether the opportunity for displaying such behaviors was high or low in the particular school in which the student-teacher was placed. The teacher behavior ratings were corrected according to these situational factors. This points to an important aspect of such research in which the prediction is based not only on certain characteristics of the trainees, but also on the specific situations in which they found themselves. Regardless of the teacher herself there may be situations in which her characteristics cannot be expressed. For instance, a student-teacher may have taught in a school where the demands on her time were such that she was unable to provide "non-instructional service" to the pupils.

An important implication for the training of teachers is suggested by the fact that the relationships between the ratings made by the student-teacher, the supervising teacher, and the teaching fellow on each of the eight behaviors was quite low. This means that even at the end of the student-teaching period when these ratings were made, there was little agreement between two supervisors as to how this student behaved; and the student himself had quite a different picture of his performance from those of the supposedly objective observers.

Study III: Authoritarianism in Teaching[4]

One of the most widely used concepts in the behavioral sciences today is a personality syndrome labeled "authoritarianism" (cf. 3). Much research has related authoritarian attitudes to a variety of personal and interpersonal behaviors. In teaching, concepts like authoritarianism have been widely used, also.

This study is an effort to develop an accurate measure of one particular aspect of personality and to investigate its manifestation in classroom behavior.

A 150-item attitude scale was developted. Included were the items of the F-Scale, a widely used measure of authoritarianism. The total scale was administered to 100 teachers of intermediate grades. These were experienced teachers in a suburban community near Boston. The teachers' classroom behaviors were rated by both the principals in the schools and also by the teachers' supervisors. In part, these ratings are the same as the ones used by Seibel.

The data collected are now being analyzed. The outcome will relate certain sub-scales in the attitude battery to certain objectively defined teacher behaviors. Potentially, this study may provide an attitude scale which will be useful for selecting teachers.

Study IV: The Influence of Alternatives on Problem Solving[5]

This study illustrates how a circumscribed problem in the area of teacher competence may ramify to many aspects of teaching. From Stuart's study, we hypothesized that one of the classroom manifestations of authoritarian beliefs held by teachers would be teaching in a dogmatic fashion. That is, the more authoritarian teachers would present one method of problem solving to the children and expect them to follow that one method. On the other hand, we would expect that teachers low in authoritarian beliefs would permit alternative solutions to problems. This takes the step from teacher characteristics to observable teacher behaviors.

The next step involves the effects of such classroom teaching on pupil behavior. Here we hypothesized that if pupils are taught that problems can be solved in one and only one way, they will transfer this problem-solving approach to other aspects of school work. By contrast, pupils who are taught that there are various alternatives to solving the same problem would handle new problems in a more efficient manner.

Ackerman (2) tested the second prediction—that teaching problem solving with only one alternative will result in less efficient problem solving than teaching that there are two solutions to a problem.

He used a controlled experimental procedure in which one group of children in the intermediate grades were taught to solve a problem by using one solution only, and the second group of children were taught to solve the same problem with two alternative solutions. Then, the efficiency of problem solving on both similar and

different types of problems was tested.

The results indicate that a child taught alternatives is able to approach new problems in a more flexible fashion; that he will attempt more types of solutions, if he has once learned that problems can be solved in more than one way. By trying more solutions, the child also was able to solve more problems correctly. However, trying various alternatives is time consuming, and it was found that the time spent by the "alternative" group in obtaining the correct solutions was greater than the "no-alternative" group. This means that flexibility of approach was enhanced by teaching more alternatives but that efficiency, in terms of length of time spent in solving the problems, was decreased.

The implications of this study are of two kinds. One, it demonstrates how the whole sequence of hypotheses from teacher beliefs to pupil change can be tested. Assuming that it can be shown that highly authoritarian teachers, as measured by Stuart's instrument, will indeed tend to teach only one method of solving each problem—we can predict a learning outcome directly from a knowledge of the beliefs of a teacher.

Secondly, the results demonstrate the efficacy of a teaching method which can easily be adapted to various problem solving tasks in the schools.

Study V: Ego-Involvement in Teaching[6]

The process whereby a student-teacher does make a decision without reservations to perform as a teacher is referred to by us as becoming "ego-involved in teaching". We believe that such ego-involvement varies with the extent to which the student-teacher sees the role of the teacher as congruent with his ideal self-picture.

To investigate such ego-involvement, we designed a long questionnaire inquiring about certain beliefs and experiences which were regarded as relevant to involvement in teaching. The questionnaire was administered to students when they entered teacher training.

Inspection of the questionnaires indicated that it was often clear that the respondent was highly involved in teaching or, at the other extreme, was highly dubious of his choice of career. Frequently, an unsolicited remark such as "I probably will not be a good teacher because I'm not at all interested in it" revealed the ego-involvement of the respondent. Two judges independently rated each questionnaire as being clearly high or clearly low, or as being ambiguous. The pooling of these ratings provided a summary rating for each respondent on a five-point scale. The judges achieved a high degree of agreement.

Using this rating as a criterion, a so-called Index of Ego-Involvement was constructed from the various separate questionnaire items which correlated with the rating.

Turning to a separate sample, we computed the correlations of specific questionnaire items with the overall Index of Ego-Involvement. In this way, we were able to see which questionnaire responses were consistently related to ego-involvement.

Following are the factors which were significantly related to the Index of Ego-Involvement. First, the favorableness of the father's opinion of the student's career choice as well as the opinion of other members of her family and friends; the more favorable the opinion, the greater the ego-involvement.

More of the high ego-involvement subjects say there are no other occupations which would provide satisfactions similar to those they expect from teaching, whereas the low respondents more frequently mention clinical or artistic work.

More of the highs than the lows would not leave teaching for a higher salaried position elsewhere, and those of the highs who would leave cite a higher salary than do the lows as necessary to entice them away.

How important the subject feels it is to be of public service relates directly to involvement, as do the following:

The amount of intellectual stimulation expected from teaching,
The importance of intellectual stimulation,
The earliness of the respondent's consideration of teaching as a career.

On the other hand, the following items vary inversely with ego-involvement:

The amount of starting salaries considered adequate (the larger the amount, the less the ego-involvement) as well as the amount of salary considered adequate five years hence.

The number of reasons given by the respondent for possibly leaving education as a career. (The more reasons given, the less the involvement.)

More of the lows mention security and steady income as an advantage in teaching, whereas more of the highs mention such things as opportunity to work with children.

An evaluation of these and other results led us to conclude that we had isolated an internally consistent domain of responses related to a variable of real psychological significance. The next question asked was whether the Index has any practical predictive value. The Index is probably the best single predictor of permanency in teaching, a criterion variable obtained from

an analysis of a follow-up questionnaire[7] which was filled out by the subjects at the end of their first year of on-the-job-teaching, two years after completing the ego-involvement questionnaire. In other words, the more ego-involved in teaching a respondent was found to be as of the beginning of graduate training, the more committed to teaching he was found to be two years later.

This study demonstrates that there are attitudes and events which differentiate those people who have enthusiastically and wholeheartedly accepted teaching as a career from those who are more reluctantly or opportunistically involved in teaching. The approval of one's family and friends seems to be particularly important. Furthermore, such enthusiasms were found to have substantial value in predicting later commitment to teaching.

Study VI: The Interests of Teachers

From informal interviews with the student-teachers in our sample and examination of their test and questionnaire materials, we have found three, and possibly four, major interest patterns. First, there is interest in children, the desire to work with children. Second, there is altruistic interest, wanting to be of service. Often this interest is difficult to separate from child-interest, although usually the desire is to be of service-in-general—to children, to adults, to the community, to the nation. Third, there is interest in subject-matter. Subjects strong in this interest seem to have chosen teaching primarily because of keen interest in some particular subject—history, for example. Lastly, there seems to be self-interest. These people appear to have chosen teaching as a career primarily because they believed it would provide security, good vacations, or an opportunity to pursue some unique personal goal.

To obtain indices of the strength of these interests for each student-teacher, we relied on the responses to what we have called the ego-involvement questionnaire. Two judges selected, from all the responses which were coded, those responses which seemed to be related to each interest. A statistical analysis of these items provided scales measuring each of the first three interests. We were not able to obtain a stable measure of self-interest, probably because it is a heterogeneous category of interests. Using the obtained scales, we computed total scores for each student-teacher in a separate sample.

When the average interest scores for each of the teacher-training programs are examined, the elementary student-teachers have a substantially higher child-interest score than the secondary student-teachers. Also, the elementary group was found to have significantly higher service-interests, and as one would expect, the secondary group was higher in subject-matter interest.

Men and women student-teachers on the average, did not differ in any of the interests.

We were interested in the relationship between the interests and permanency-in-teaching as measured from responses to the follow-up questionnaire. No clearly significant effects were found but the trends are provocative. In general, high child interest and high service interest seem to be important determinants of permanency in teaching. More evidence for this tentative conclusion will be cited in the next section.

Study VII: Factors Related to Withdrawal from Teaching

Of prime interest to the Project has been the prediction of withdrawal from teaching as a career. The word permanency refers to the extent to which each student-teacher after graduation has made teaching a career and plans to remain in teaching in the future.

On the basis of a follow-up questionnaire sent to the class of '54 just as they were completing their first year of teaching, the total sample of 144 people was divided into three broad groups: the high permanency group, the doubtfuls, and the low permanency group. Roughly speaking, the permanent group (N = 75) are those who taught full time in the academic year, 1954-55, and indicated that they definitely planned to continue teaching in the future; the doubtful group (N = 37) are those who indicated that there was some doubt in their minds about teaching in the future; and the impermanent group (N = 20) are those who had withdrawn from teaching or who indicated that they planned to withdraw and said that they probably would not teach in the future. In addition, there is an "unclassifiable" group (N = 12) for whom we have no information.

There are no significant differences in the proportions of men compared to women or the proportions of elementary compared to secondary teachers in the three permanency groups.

The questionnaire responses of the low permanency group revealed that two were studying for advanced degrees, five were engaged in art, musical, or editorial work, four were in non-teaching educational work (psychological research), four had positions in business, and one was in military service. All of these subjects said they probably or definitely would not teach in the future. In addition, one person planned to leave teaching to do industrial research, and two women were leaving to raise families and stated that they would not return to teaching.

The doubtful group consists mainly of women who were leaving teaching to raise families and were undecided as to whether they would return to teaching. Most of the others in the doubtful

group are men who were in military service and indicated doubt about teaching in the future.

The reasons for giving up teaching provided us with no generalizations other than the obvious one that the low permanency people seem to prefer some other position to teaching. This indicates, however, that predicting lack of permanency is a complex task, for there may well be subjects who withdrew from teaching not because they found teaching unsatisfactory, but because they regarded some other career (housewife, artist, etc.,) as more satisfactory. By absolute measure, teaching may have been highly satisfactory for these people. Nevertheless, we would expect to find some communality among those who, either by absolute or relative measure, found teaching unsatisfactory.

To this end, we have examined the scores of the three permanency groups on all the measures the Project obtained. It should be kept in mind that this was an exploratory effort. A large number of variables were examined, meaning that some striking differences could be expected to be found purely by chance. Before we put too much trust in the following findings, they should be replicated.

Out of all the conventional instruments and the scales developed by the Project, only two significantly discriminate among the three permanency groups. They are the Ego-Involvement Index (see Study V), and self-ratings of rapport derived from Seibel's work (see Study II).

That people who were ego-involved in education early in their training should be more permanent teachers was clearly expected. Interpreting the positive relationship of the rapport ratings is more difficult, however. Being able to interact effectively with children is important, as has been noted elsewhere. More evidence will be cited shortly. It is, therefore, tempting to conclude that the self-ratings of practice teaching performance validly foretold subsequent success with children and that those who were not successful with children withdrew from teaching.

This conjecture fits well with the finding from the follow-up questionnaire that a larger proportion of the high permanency group reported that they were successful in working with individual children during their first year of teaching. Furthermore, we found in Study VI that students who had high interest in children tended to have higher permanency scores. Lastly, an item from a biographical questionnaire asking the number of children which the respondent wanted in her own family was found to be significantly related to permanency, the high permanency group stating they wanted more children than the lower permanency groups did. We regard this series of findings as fairly convincing that genuine interest in children makes for low withdrawal from teaching. Furthermore, this generalization is true for both men and women, and for elementary as well as for secondary teachers.

For the men only, the Certified Public Accountant Scale of the Strong Vocational Interest Blank generates significantly different means among the program groups, high CPA scores being associated with low permanency. This suggests that men who enjoy attending to details and want orderliness in their work do not find teaching satisfactory as a career.

Particularly interesting is the relationship of academic performance during graduate teaching to permanency. Lower permanency men had higher academic averages than the permanent group, whereas the reverse is true for the women. We interpret this to mean that the more intellectually proficient men are more likely to withdraw from teaching than the less proficient men, but that the more proficient women do not abandon teaching. In other words, the more proficient men have a number of different pursuits open to them, whereas the women are more limited to teaching as a career.

The Depression, Psychasthenia, and Social Introversion scales of the Minnesota Multiphasic Personality Inventory provide similar results: the lower the scores on these scales, the higher the permanency for the elementary group only. No relationship is apparent for the secondary group. This suggests that teaching at the elementary level places a premium on emotional health.

From the follow-up questionnaire we see that a higher proportion of the doubtful and low permanency groups taught in urban communities. This finding has not as yet been pursued. Did more of the teachers in urban communities encounter "blackboard jungles"? Secondly, from the follow-up questionnaire, we find that a larger proportion of the impermanent groups found their relationship with administrators to be a source of some dissatisfaction. This finding was predicted, since we feel that a teacher's relationship with supervisors in the school is crucial in determining acceptance of teaching as a career.

A summary satisfaction score, obtained from ratings of the degree of satisfaction which each teacher derived from nine different teaching activities, failed to discriminate among the permanency groups. We regard this as an important finding. It may well be that satisfaction obtained from teaching is more a function of the level of expectation of the teachers, and that low satisfaction means only that the teacher had very high expectations, not that he or she is likely to reject the role of teaching. We would expect, however, that continued lack of satisfaction would result in withdrawal from teaching. Only a longer follow-up of the subjects would provide evi-

dence for this hypothesis.

The biographical material provided a number of significant relationships. These findings should be regarded with particular caution since there are relatively few significant ones out of a large number of relationships tested. There is one finding, however, in which we have high confidence: the higher the social class background of the student, the more likely he is to withdraw from education. We can further pinpoint this finding as perhaps being due to the special characteristics of the Harvard sample. There were disproportionate withdrawals among the upper class people.

We tend to interpret the social status findings in terms of mobility. From the ego-involvement work (Study V), we know that family approval is essential to high ego-involvement. Assuming that teaching is widely regarded as a middle-class role, being a teacher would represent downward mobility for upper class subjects and either upward or no mobility for lower-status subjects.

We also find that those assigned to the lower permanency groups report that they were more "bookish" during adolescence than those in the high permanency group which is consistent with the tendency for the low permanency people to report greater interest in subject-matter.

In conclusion, many factors were found to be related to permanency in teaching. Significant relationships were obtained despite the obvious grossness of the criterion. It is vital, however, that the findings be replicated with an independent sample, for despite our caution, some of them may be chance occurrences; and the findings need further analysis in order to ascertain which of the many possible explanations for each finding is tenable. Furthermore, we would like to see the criterion of permanency refined. For instance, the present "doubtful" category is a very heterogeneous group of subjects, including women who have left for marriage, men still in the service, teachers who have left teaching for a non-teaching educational job, and full-time teachers who are not sure they want to teach in the future. Surely, the accurate prediction of the permanency of these various groups will require separate consideration of each group.

Study VIII: The Differences Between Student Elementary School Teachers and Student Secondary School Teachers[8]

As a by-product of the several studies of the Project, we have accumulated a large number of variables that indicate differences between students who are preparing to teach in the elementary schools and those preparing for secondary school teaching.

Let us highlight the principal findings. Whenever feasible, we have considered the elementary group[9], the secondary men, and the secondary women as three distinct groups. Frequently it was observed that on a given variable the secondary women and the elementary group occupied extreme positions on a variable, with the secondary men falling between the other two groups. This is attributable, we believe, to the recognized social pressure against men entering elementary teaching, which is widely regarded as a female's job. This being the case, one would predict that among any group of secondary school teachers one would find a portion of the men with attributes similar to elementary school teachers, because if certain cultural pressures did not exist, these men might teach in the elementary schools.

One conclusion which these observations suggest is that if the pressures preventing men from entering the elementary program can be reduced, many men will be found who will be well adapted to elementary school teaching.

Consider now the specific differences which exist between the programs. We were particularly interested in differences in the responses to the follow-up questionnaire.

First, there are the obvious differences resulting from the fact that elementary school teachers teach young children and secondary school teachers teach older children. We refer here to such findings as, for example, secondary school teachers' chaperoning more dances than do elementary school teachers.

A second group of differences is less obvious. A larger proportion of the elementary teachers reported that they encountered no disappointments in their work.[10] Also, when we derive a measure of the total satisfaction which the teachers obtained from nine different teaching and related activities, we find that the elementary teachers are more satisfied with their first year of teaching. Likewise, when we analyze the self-appraisals of each respondent's success in performing the various activities, the mean total score of the elementary teachers is higher. This suggests why the elementary teachers reported more satisfaction, namely, they felt they were more successful in their work.

A second possible explanation for the greater satisfaction of the elementary teachers is suggested by the fact that a larger proportion of the elementary teachers report that they have the type of job which they desired at the time they started their teacher training. This finding was predicted, since the job requirements of secondary school teachers are more restricted, i.e., in addition to the preferences which an elementary school teacher may have concerning kind of community, size of school, etc., most secondary school teachers have a preference also in regard to the subject-matter they wish to teach.

When we look at the specific satisfactions and the specific successes enjoyed by the two groups of teachers, we find many differences. Handling discipline, helping children with problems, dealing with parents, instilling attitudes, imparting knowledge, and planning the curriculum all were either more satisfying or more successfully performed, according to their own appraisals, by the elementary teachers. The reader is reminded that despite the greater satisfaction and success reported by the elementary teachers, the permanency ratings of the elementary teachers are not higher than the secondary teachers, i.e., the frequency of elementary teachers in our "high" permanency category is not greater than the frequency of secondary school teachers.

The measures which were administered to our subjects at the time they entered provided many discriminations between the people in the two training programs. The most striking and, we believe, the most informative differences were in the interest scales which were described earlier (Study VI). As was predicted, the elementary student-teachers are substantially more interested in children, whereas the secondary school student-teachers have much higher subject-matter interests.

In Seibel's work (Study II), the student-teachers were asked to rate their own rapport with children. In addition, ratings of each student-teacher's rapport were made by supervising teachers. The elementary student-teachers rated themselves significantly higher than did the secondary student-teachers, yet there is no significant differences between the groups for the supervising-teachers' ratings. Interpreting this rating phenomenon is difficult. If nothing else, it can be said that the elementary student-teachers perceive themselves as having warmer relations with children than do the secondary student-teachers. Whether they do in actuality is irrelevant for these purposes. We also found that the elementary teachers have had more pre-teacher training experiences with children in which they served as the leader or the teacher, all of which suggests that the elementary teacher selects that level of teaching primarily because she likes children and feels that she gets along well with them. This is almost a truism, but we feel it deserves emphasis lest we lose sight of it.

The Minnesota Teacher Attitude Inventory is designed to predict, among other things, the warmth of the interaction between teacher and student. As might be expected, the mean of the elementary group is higher than that of the secondary student-teachers. Also, the elementary group is lower on the F Scale of Authoritarianism. But there are complications: When we omit from the elementary and the secondary groups those student-teachers who majored in psychology as undergraduates and compute the differences between the remainder of each group, we find that there are no significant differences in authoritarian attitudes between the elementary and secondary students.

The interpretation of this finding is largely a matter of personal taste. It suggests, however, that there is no difference between the type of student in each program insofar as this stable personality trait is concerned, but rather that there is a more superficial difference resulting from the study of psychology as undergraduates. Our present advice is that one should exercise great caution in drawing conclusions about different personality types in the two programs.

For our sample, the secondary students score higher on the Miller Analogies Test, which is designed to predict academic proficiency at the graduate level. We say "for our sample," for this finding may well be a by-product of the admissions' procedure. It is known that in selecting students for the secondary school teaching program, more emphasis is placed on previous academic performance than in selecting elementary student-teachers. Since this past performance and the Miller Analogies Test scores can be expected to be highly correlated, the obtained differences would result. It is also true that for our sample there is a small positive correlation between subject-matter interest and Miller Analogies Test scores, indicating that those students who select the secondary program because they are keenly interested in some particular subject-matter, tend also to have higher MAT scores.

The last group of variables to be considered is that obtained from two biographical questionnaires also administered at the time of entrance. It was previously noted that the elementary student-teachers report a larger amount of teacher-leadership experience with children than do the secondary student-teachers. Perhaps related to this is the finding that more of the secondary student-teachers report both a lack of social relations during adolescence and a considerable degree of "bookishness" during adolescence.

Probably the most striking difference between the programs is the much larger proportion of elementary student-teachers who majored in psychology as undergraduates. There are at least three possible reasons for this. First, it is known that those who select the students for the elementary program are partial to candidates with some training in the behavioral sciences. Second, psychology does not usually constitute a subject-matter specialty for secondary school teaching. Third, it is entirely possible that studying psychology as undergraduates stimulated the interest of the students in young children, thereby influencing them to choose the elementary level for teaching.

What conclusions can be drawn from the program differences reported so far? The findings

provide us with insights into the process of career selection. They have shown that many factors interact to determine program selection. There is the social pressure which prevents men from entering the elementary program. There are the beliefs of the admissions committees which select the students for the two programs. Which field the student chooses to specialize in as an undergraduate seems to be an important determinant. Having certain experiences as children and adolescents seems to predispose students to prefer one program or the other.

These findings, however, merely describe the differences which exist. The real question is whether these differences are "essential." Can it be demonstrated, for instance, that a student with high verbal intelligence is—other things being equal—more likely to be a successful secondary school teacher than a successful elementary school teacher? In hopes of contributing to the answers to questions such as these, we looked at the way in which permanency and program affiliation interact. Surely, role permanency (i.e., not withdrawing from teaching) is one criterion of "success." If a measure provides an "essential" difference, then it should be demonstrable that there is a significant difference between the way in which the measure is related to permanency for elementary school teachers and the way in which it is related to permanency for the secondary school teachers.

As yet we have found no such differences. In other words, we cannot point to a single attribute and say that it is essential for one group of teachers to have it, but not the other.

Our experience does indicate that establishing the necessity of program differences is a more subtle problem than might be expected and that some caution should be exercised when one uses criteria in selecting elementary teachers which are different from the criteria for secondary teachers.

Concluding Remarks

The eight studies which have been summarized do not exhaust the work of the Project. The major unfinished effort concerns the evaluation of practice-teaching performance. We question, however, whether ratings of a small number of attributes which are made by observers, either critic teachers or teaching fellows, will prove to be acceptable measures of teacher competence. We have seen, for instance, that even when carefully-defined rating scales are used, there is substantial lack of agreement among different groups of raters, e.g., supervising teachers and teaching fellows. Which are the more valid ratings, we do not know. Factors influencing the ratings made by different supervisory groups need much further investigation.

Assuming that reliable measures of teacher behavior can be obtained, do they have any relevance as criteria of our schools' objectives? We have seen that at least one kind of teacher behavior, namely, warm and friendly behavior, is related to how much work students perform. But what of the many other teaching behaviors and the many different consequences such teacher behavior can have in terms of teaching outcomes? The research literature includes a modicum of work which is relevant to the problem, but we venture to say that for the majority of the teacher behaviors which typically are regarded as "good" and "desirable," there is little evidence that they have significant effects on student performance.

Each of the eight studies summarized was conceived as an independent effort but each is logically related to the others. Cogan found that friendly teachers got more self-initiated and required work from their pupils. Seibel demonstrated that characteristics like friendliness can be predicted for student teachers from attitudes, previous experiences, and other personality measures. Drawing on Seibel's findings in regard to the predictive value of attitude measures, Stuart devised a measure of authoritarian beliefs and obtained ratings of dominant behavior in the classroom with which to validate his measure. Ackerman investigated the hypothesized effects of one aspect of dominant behavior, namely, a way of teaching children to solve problems.

Whenever predictions were made by the different members of the Project a need was felt for a measure of motivation to teach, for prediction of teacher behavior is likely to be enhanced if the teacher is personally involved in her job. Hilton's work on ego-involvement and interests was designed to meet this need.

We have discovered that prediction of teacher behavior is a complex task with many questions which demand further investigation.

Our hope, though, is that these studies contribute to the understanding of competent teaching, conceptualized not as vague and global judgments but as specific, objectively-defined behaviors which have demonstrable effects on the performance of pupils.

FOOTNOTES

1. The members of this committee were Drs. M. L. Cogan, H. Levin, Arthura Michael Roberts, R. J. Schaefer, Pauline S. Sears, and F. G. Watson.

2. This study was done by Dr. Morris L. Co-

gan, now Lecturer on Education, Harvard Graduate School of Education. For a detailed account of this study see reference 4.

3. This study was done by Dr. Dean W. Seibel, now at the Educational Testing Service, Princeton, New Jersey. For a full account of the study see reference 8.

4. This study, as yet not completed, is being carried on by William A. Stuart, Educational Testing Service, Princeton, New Jersey. For further details about the study, you may write to Mr. Stuart.

5. This study was done by Dr. Walter I. Ackerman, now at the Beth-El Day School, Belle Harbor, New York. For a full account of the study see reference 2.

6. Dr. Thomas L. Hilton had the major responsibility for this study, as well as Studies VI and VII. For a more full account of some of these studies see reference 5.

7. This criterion variable is discussed in detail in Study VII.

8. This study was done by Drs. Seibel and Hilton.

9. For practical reasons, the 36 women and the 4 men in the Elementary program are considered one group, the elementary group.

10. Except where noted, all differences reported are statistically significant. We have, furthermore, consistently checked to make sure that the obtained differences are not, in actuality, differences between sexes which generate apparent program differences because any group of secondary school teachers will contain a larger proportion of men than will an elementary group.

REFERENCES

1. Ackerman, W. I. "Teacher Competence and Pupil Change," Harvard Educational Review, XXIV (1954), pp. 273-89.

2. Ackerman, W. I. Presentation of Alternatives and its Relation to Set in Problem Solving, unpublished Ed. D. thesis, Harvard University, 1956.

3. Adorno, T. W., and others. The Authoritarian Personality (New York: Harper and Brothers, 1950).

4. Cogan, M. L. The Relation of the Behavior of Teachers to the Productive Behavior of Their Pupils, unpublished Ed. D. thesis, Harvard University, 1954.

5. Hilton, T. L. Ego-Involvement in Teaching Its Theory and Measurement by a Word Completion Technique, unpublished Ph. D. thesis, Harvard University, 1955.

6. Levin, H. "A New Perspective on Teacher Competence Research," Harvard Educational Review, XXIV (1954), pp. 98-105.

7. Sears, R. R., and others. Patterns of Child Rearing (Evanston, Ill.: Row, Peterson (in Press).

8. Seibel, D. W. The Prediction of Qualities of Interaction Between Apprentice Teachers and Pupils, unpublished Ed. D. thesis, Harvard University, 1955.

9. Wickman, E. W. Children's Behavior and Teacher's Attitudes (New York: Commonwealth Fund, 1928).

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THE MEAN OR AVERAGE DEVIATION IS A MINIMUM WHEN TAKEN FROM THE MEDIAN: A GEOMETRICAL PROOF

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THE MEAN or average deviation of a distribution with respect to a score P is defined as the sum of the absolute values of the deviations of the scores from P divided by the number of scores.

The assertion stated in the title of this article is usually found in educational statistic texts without proof. Some texts mention that the proof requires a knowledge of higher mathematics and therefore it is omitted.

This article presents a proof based on a few of the logical principles of elementary plane geometry and should be within the understanding of any college student.

Let the n scores in a given distribution be $Y_1, Y_2, \ldots, Y_n$ arranged in ascending order as to value. Let the scores Y_i be represented by points X_i (see figure below) on the line AB where the point A is taken as the zero point and the positive direction along the line is from A towards B. The distance from A to X_1 equals Y_1, from A to X_2 equals Y_2, etc. X_i is to the right of X_j if i is greater than j and Y_i is greater than Y_j. X_i has the same position on the line AB as X_j if Y_i equals Y_j.

For convenience, let us consider that $X_1, X_2, \ldots, X_n$ are the scores of the distribution. Let X_m be the median and X_p be any other point where X_m is not equal to X_p, also let X_m be smaller than X_p.

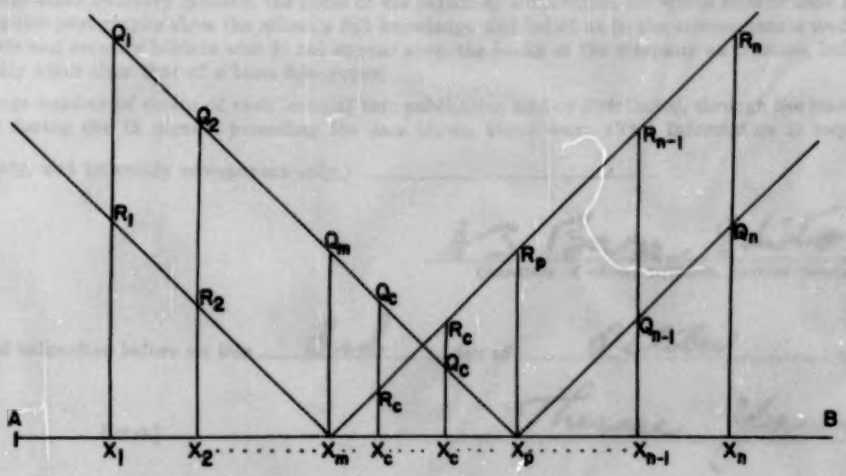
At X_m and X_p construct rays (on the same side of AB) making forty-five degree angles with AB. At each point X_i, draw perpendiculars to AB. Let Q_i be the points of intersection of the perpendiculars with the rays from X_p. Let R_i be the points of intersection of the perpendiculars with the rays from X_m.

(1) $|X_1-X_m| + |X_2-X_m| + \ldots + |X_n-X_m| * = X_1R_1 + X_2R_2 + \ldots + X_nR_n$

Note: triangle $R_iX_iX_m$ is an isosceles right triangle.

(2) $|X_1-X_p| + |X_2-X_p| + \ldots + |X_n-X_p| = X_1Q_1 + X_2Q_2 + \ldots + X_nQ_n$

Note: triangle $Q_iX_iX_p$ is an isosceles right



* $|X_1-X_m|$ means the distance or value is considered positive.

triangle.

The left member of (1) is an expression for the sum of the absolute values of the deviations from the median X_m. The left member of (2) is an expression for the sum of the absolute values of the deviations from any other point X_p. The mean or average deviation in each case is found by dividing each sum by n, the number of scores. Therefore, we are concerned with the relationship of the two sums in the left members of equations (1) and (2).

(3) R_jQ_j equals X_mX_p for j less than or equal m and j greater than or equal p.

(4) X_m is the median hence there are more scores less than or equal to X_m than scores greater than or equal to X_p, except in the case noted in (10).

(5) A segment equal to X_mX_p must be added to each X_iR_i (i less than or equal to m) to get the corresponding X_iQ_i.

(6) A segment equal to X_mX_p must be subtracted from each X_iR_i (i greater than or equal to p) to get the corresponding X_iQ_i.

(7) A segment less than X_mX_p must either be added to or subtracted from X_cR_c to get the corresponding X_cQ_c for a c greater than m but less than p; that is, X_c is a point between X_m and X_p.

(8) In view of (4), (5), (6), and (7) it is obvious that a positive amount must be added to $X_1R_1 + X_2R_2 + \ldots + X_nR_n$ to get $X_1Q_1 + X_2Q_2 + \ldots + X_nQ_n$.

(9) Therefore the latter sum in (8) is the greater. By referring to the equalities in (1) and (2) it is easy to see that

$$\frac{|X_1-X_p| + |X_2-X_p| + \ldots + |X_n-X_p|}{n}$$

is greater than

$$\frac{|X_1-X_m| + |X_2-X_m| + \ldots + |X_n-X_m|}{n}$$

(10) If there are two middle scores and X_p is the larger middle score (or a point between the middle scores) the number of scores less than or equal to X_m is equal to the number of scores greater than or equal to X_p, hence:

$$\frac{|X_1-X_p| + |X_2-X_p| + \ldots + |X_n-X_p|}{n}$$

is equal to

$$\frac{|X_1-X_m| + |X_2-X_m| + \ldots + |X_n-X_m|}{n}$$

Form 3526
Rev. 8-60

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